A CHILTON PUBLICATION

the iron Age

NATIONAL METALWORKING WEEKLY

February 26, 1953

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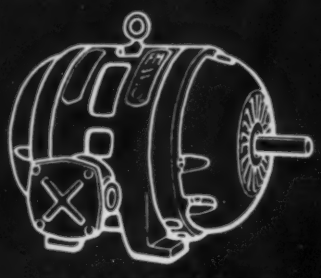
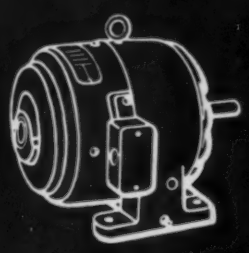
TS PAGE 2

Enclosed Fan Cooled



Explosion-Proof Motors



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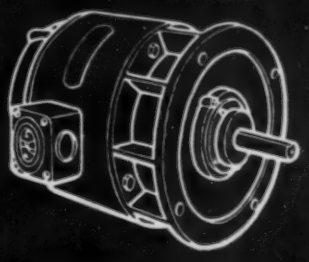

Flange-Mounted Motors

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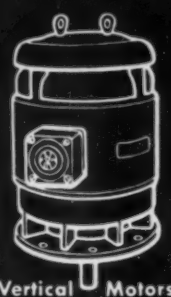
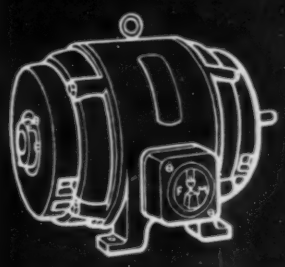
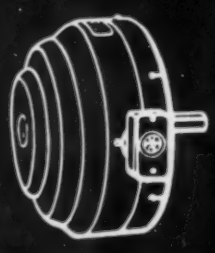


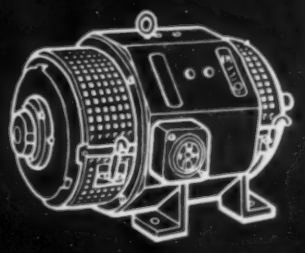
Vertical Motors



General-Purpose Ball-Bearing Motors

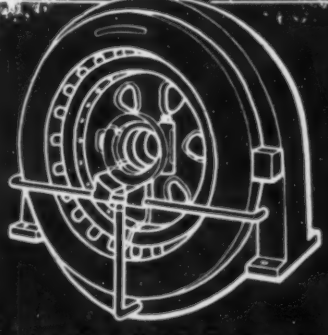


Axial Air Gap Motors

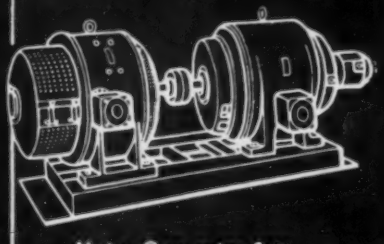


D.C. Motors

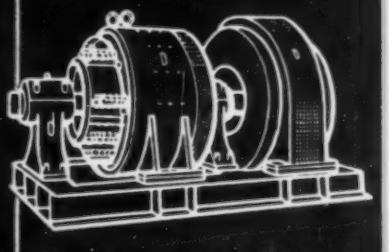
ed A.C. Generators



Low-Speed A.C. Generators



Motor Generator Sets



Frequency Changer

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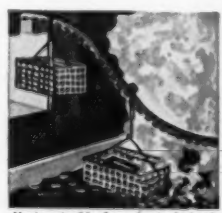
How many SPARK in a Spark Plug

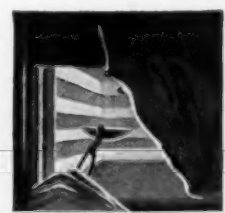
Surprising, the confidence that people have in spark plugs. No one stops to question how many "sparks" they're good for, because long-life performance has come to be taken for granted. Yet, when you get right down to it, you'll find good reasons for this complete consumer confidence. And, from a "sparking" point of view, perhaps the most important is the almost universal use of special Hoskins alloys for the vital electrode wires.

Producing the wire that sparks your car to power is a tough and tricky business. It requires special care in the selection of raw materials. Special melting and production techniques. Plus extremely close control over alloy composition and uniformity of quality throughout the entire manufacturing process.

Yet that's exactly the kind of alloy that Hoskins is qualified to produce best. For, among the other quality-controlled alloys developed and manufactured by Hoskins are: Alloy 717—for facing engine valves; Alloy 785—for brazing belts; Alloy 502—for countless heat resistant mechanical applications. Then, too, there are the Chromel-Alumel thermocouple alloys . . . guaranteed to register true temperature-EMF values within specified close limits. And, of course, Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.



Hot stuff for hot jobs! Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.



Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.

Chromel-Alumel ther couple alloys accura measure exhaust temp tures of jet aircraft engi

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How To Start A Depression

PLENTY of Americans think there is going to be a depression. Some think it will be this year; others feel it may be next year. They just know there will be one; that it will be a humdinger.

Most of these people don't know how to start this depression even though they might have been through one in the 30's. They are doing their best to give it a little push.

There are several ways they could get this off to a good start. If they all pulled together maybe a lot of us would be back to work again at the old apple stand. Here are a few things they could do:

They could talk about it morning, noon and night. Soon they would get enough people scared enough to take them seriously.

If they are in business they could issue a general order to buy nothing new, nothing that would make their products better and cheaper or sales more assured. They could cut expenses to the bone regardless of how it was done or what it affected.

If they are putting out a product that is selling good they could sit back and forget about it. Send the salesman home; do nothing to keep up with competition from mavericks who work like the devil at least until the depression hits.

They could let their inventories reach a low point—low enough not to have what the customer wanted when he wanted it. This could lose sales, cause unemployment and dissipate markets.

If they were big wheels they could make a stuffy pronouncement to the press that things weren't quite up to snuff. They could start a whispering campaign that they had it from so and so that the bottom was falling out. Gossip is juicier than facts.

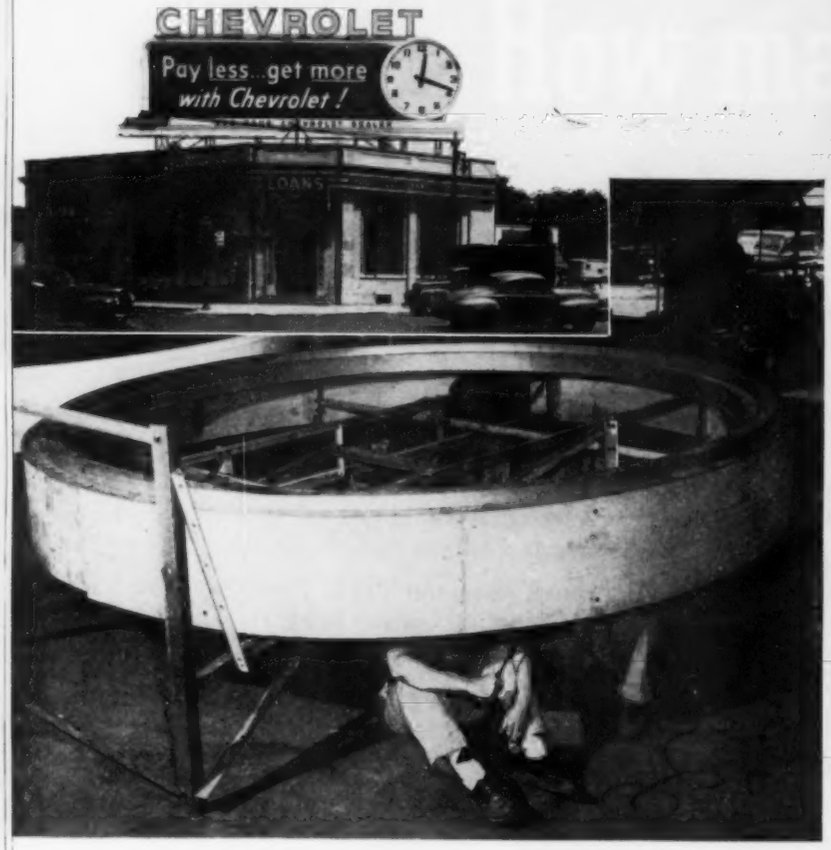
They could start to believe what many experts have said for 5 years: "Here it comes boys, I knew I would be right some time." (Of course if they listened to them and did nothing for 5 years they are in a depression now and don't know it.)

As a final sure-fire thing to help start a depression they could do the following: forget what their ancestors learned; have no faith in people or anything; sit on their hands and wait for doomsday; always start a project on the basis that it won't be a success and when things look really bad run around like mad screaming at the top of their voices, "Didn't I tell you so?"

Tom Campbell

Editor

SHARON Galvanite



Leading Sign Builder Chooses Galvanite

● Builders of signs for outside display consider atmospheric conditions their greatest single enemy. The snow, sleet and wind conditions in the north and east, the tremendous heat in the south and southwest, the salt air of the oceanic areas and the destructive fumes of industrial concentration all must be considered when designing and building a display for national consumption.

That's why a great many sign builders have turned to Galvanite* — the weather-fighting, zinc coated steel developed by Sharon to add life to steel where it is subjected to the constant ravages of the atmosphere. Galvanite* is used to a great extent in the automotive, appliance and building industries because it is easy to use, it holds its coating under severe forming conditions and provides an excellent surface for enameling, painting or further finishing.

If you are looking for a good, serviceable, weather-resistant steel be sure you have all the facts Sharon's great Galvanite*. Con the Sharon office nearest you write direct for fully explana Galvanite* booklet.

*TM

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Where Rust Is A Problem-First Consider

SHARONSTEEL Galvanite

SHARON STEEL CORPORATION *Sharon, Pennsylvania*

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Dear Editor:

Letters from readers

This Is America

Sir:

Your editorial "This Is America" in the Feb. 5 issue is very excellent. I believe it is one of your best.

Congratulations!

B. R. REUSCHER
President

Keystone Carbon Co.
St. Marys, Pa.

New Casting Process

Sir:

We culled your Feb. 5 issue for further information on your first item on p. 89.

Can you tell us where we can obtain information on this new precision casting investment and process?

W. C. JENKIN
General Manager

Midwest Precision Castings Co.
Cleveland

Leonard W. Dean, The Dean Co., 516 N. Rose Ave., Park Ridge, Ill., can give you additional information.—Ed.

Radiation Instruments

Sir:

In the Jan. 29 issue, p. 55, there appears an article relative to radiation instruments. Quoting from this article, "of specific interest to the metal industry is their application and use for measuring the height of molten metal in furnaces. Another use is the detection of flaws in metals."

We would appreciate additional information concerning these two applications of radioactive materials.

C. D. FOULKE
Research Metallurgist

Weirton Steel Co.
Weirton, W. Va.

Write to Paul Aebersold, Chief, Isotopes Div., Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn., for additional information.—Ed.

Sir:

In your article "Instruments: Radiation Field Grows," Jan. 29 issue, you mentioned that royalty-free licenses, owned by the U. S. Government, are available to qualifying firms.

Can you tell us where we can obtain specific information, patent numbers and agencies to contact on these numbers?

S. L. LESTER
Research Director

Thomas & Skinner Steel Products Co.
Indianapolis

Specific information may be obtained from Roland Anderson, Chief of Patent Branch, Office of General Counsel, Atomic Energy Commission, Washington, D. C.—Ed.

Pouring Shell Molds

Sir:

Will you please forward to us any additional information that you may have on the backup system for pouring shell molds as mentioned in the Newsfront page of your Jan. 29 issue.

W. J. SEVERINGHAUS

Operations Analysis Dept.
Ford Motor Co.
Dearborn

Further information may be obtained from the Chicago Powdered Metals, Franklin Park, Ill.—Ed.

Purchasing Research

Sir:

Our national secretary has sent us a copy of John Delaney's article "Purchasing: Research Gets Staff Status" which appeared in a recent issue.

We know this will be of special interest to purchasing agents and shall, therefore, much appreciate receiving your permission to reprint it in our association magazine, the "New England Purchaser."

H. J. GRAHAM
Editor

New England Purchaser
Boston

Electrical Energy

Sir:

I read with interest your article "Aluminum: A New Energy Source?" in the July 10, 1952 issue.

The method of direct conversion of chemical to electrical energy by the method of the Pittsburgh Consolidation Coal Co. appears to have many possible uses and I should like to obtain further information on it. Will you please send me the names of persons to whom I should address an inquiry.

J. L. BOWER

North American Aviation, Inc.
Downey, Calif.

Contact M. K. Mellott, Koppers Bldg., Pittsburgh 19, Pa., who will be able to help you.—Ed.

Cast Refractories

Sir:

If possible, we would like to obtain three reprints of the article "Cast Refractories Replace Brick in Heating Furnaces" which appeared in the Dec. 18 issue.

E. F. GRIMM
Administrative Asst.

Refractories Div.
The Carborundum Co.
Perth Amboy, N. J.

How to be right—always

When you buy . . . .
Cold Rolled Strip Steel

Approximately six months ago, Kenilworth adopted the policy of identifying all cold rolled strip steel shipped to customers by tagging each coil. Copies of the tags used are illustrated above. Because Kenilworth wants you to get the cold rolled strip steel you need and to be certain that you only pay for what you get, it is right to clearly classify the two kinds of cold rolled strip steel and tell you the advantages and disadvantages of both. Kenilworth stocks and sells both and is in a position to offer unbiased recommendations to help you select the steel which is best suited to your needs and which will cost you less in the end.

In cases where quality requirements are not too stringent, we have been able to save money for customers by suggesting a switch to Sheet Coil—fine where variation in physicals are permissible and gauge variations are not objectionable or where a fine surface finish is not required. In other cases, because its better physicals permit use of lighter gauges and because of assured maximum parts yield and greatly increased tool life, we've been able to show users how they can pay more for Thinsteel and still cut costs.

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TOUGH STUFF
Axelson lathes make your tough jobs easier, delivering constant precision work, even under the most difficult operating conditions. This chip, a sample of the rugged cuts Axelson lathes can make, is from a ship shaft of #6140 chrome vanadium alloy steel 16″ in diameter. Cut was made at 25 s.f.m., feeding at .240 per revolution; depth of cut 1″. Tough stuff? Sure, but it's easy when you use an Axelson lathe.
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Fatigue Cracks

by William M. Coffey

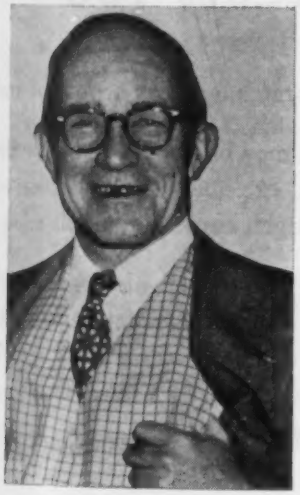
Poet's Corner

For years and years one of your fj's most famous features has been "THE IRON AGE Salutes", a weekly profile of an outstanding personality in the industry. Writing this feature is ticklish business.

These people are colossal wheels and whatever we say brings many kinds of responses, mostly from friends of the profiled—and mostly, we are happy to say, in sporting good humor. Responses to this effect are common: *". . . where do you get off saying such nice things about T. J. I've worked for the old baboon for 20 years. Next time let me write your profile."*

Feb. 5th we profiled the colorful, able and very well known Mr. W. Stewart Scott, vice-president of Sales, Pittsburgh Coke & Chemical Co. Here's the response-of-the-year to this "IRON AGE Salutes" from Mr. James M. Underwood, president of Vulcan Mold & Iron Co., Latrobe, Pa., himself colorful, able and very well known—and some poet.

I miss IRON AGE occasionally
*My interest there is spotty**
But, glancing through it yesterday
I said: "My God! There's Scotty!"
Who would have thought, to see him there
Extolled in prose quite terse
It made me feel I should declare
And write this up in verse.



So like him; quite the sporty vest
And grinning like a cat.
Because he's stolen someone's vest
And thrown away his hat.
Has he trimmed someone at dice?
Or drawn a better card?
Yes! You can say that more than twice
That Scotty's more than har-r-r-d.
But should you stop to think at length
Why all this in "IRON AGE?"
How come this sudden public strength?
How come this "honored page"?
Of simple answer, easy, too,
It's just that he unbends
And jokes and drinks; he's tease-y, too,
But makes you all his friends.
At times in past, I've had the yen
That should come harder times
I'd teach him how to sell again
And stop those monkeyshines.
But those ideas quickly fade.
Who'd want to change that guy?
Who'd want him if he's custom-made?
Who'd even want to try?
Not me—I'm sure—I'm just content
To listen to him say
In that loud voice of ill intent:
"Well—waddayawant t'day"?

*Mr. Underwood quotes: "Please excuse the 'spotty' interest — just charge that to poetic license."

It's Been Nice

We printed last week a letter from a gentleman in South Carolina who wanted some information on "an inner wheel that turns to feed seed out of the IRON AGE planter." We told him we only made a magazine and to get in touch with farm implement manufacturers.

BUT we forgot to tell him WHICH ONE! And it happens the company that makes just what he wants has been an old subscriber for years. AND our Editor-in-chief Tom Campbell is (or was) a friend of this company's president.

The company's name is the A. B. Farquhar Co., 142 North Duke St., York, Pa. Mr. W. J. Fisher is president and it is a subsidiary of the Oliver Corp., Chicago. They've been making the famous Iron Age Farm Implement line for years and years.

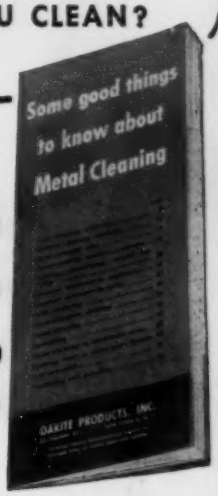
Puzzlers

All those fine people who quick-guessed the answer to the "column of soldiers" puzzle at 20 easy miles are wrong. Ha! And Mr. Burton Blank of the Cal-Texas Oil Co. who said the puzzle was so easy his 11 year-old son Button answered it at 20 miles. Ho! The correct answer is 24.14 miles. Hee!

The winners: Mr. Lewis D. (you-can't-fool-him) Rice, H. Moore, F. L. Faneuf, Evert Mason, C. Stewart Anthony, William Foley 3rd, Galen Pflederer and James Talbot. Note to Mr. Ronderierre and Mr. Hautzenroeder: As old comrades we'll give you another try. Hate to spoil that 100 pct average!

Some other puzzle winners: Theatre puzzle—Victor Trybinski, Jr., The Staff of Wayne Iron and Metal Co., E. L. Faneuf, W. M. Harris and C. S. Anthony. Coin puzzle—J. B. Medlin and George Welch.

WHAT METALS DO YOU CLEAN?



Which soils are hardest to remove?

- ☐ buffing compound residues
- ☐ pigmented drawing compounds
- ☐ oils and greases
- ☐ heat scale
- ☐ tarnish
- ☐ rust, oxides
- ☐ carbon smuts
- ☐ flux residues
- ☐ rust preventives

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ADDRESS_____

STRETCH OUT YOUR STAINLESS, TOO

There *are* ways to stretch out your supply of stainless.

For example, you may be using a grade or finish of stainless that is in extreme demand when another similar one, not as tight, could do the job adequately.

Our metallurgical staff and stainless fabricating specialists are ready to help you look into this matter and to advise you on more readily-available types of stainless that will do a satisfactory job. Feel free to call on us for this specialized help.

CRUCIBLE first name in special purpose steels

52 years of Fine steelmaking

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the Iron Age
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THE IRON AGE Newsfront

RADIOACTIVE METAL AND GEIGER COUNTERS may compete with the electric eye. Because the radioactive signal can be made more selective and less subject to error, industrial use of this combination may signal a long-range development of substantial importance.

TRADITIONAL SUMMER SLUMP IN ANTENNA production for car radios and home television sets is unlikely for 1953. Due largely to scarcity of copper and aluminum, demand is still out-running production. Currently about 75 pct of new cars are antenna-equipped on leaving the factory.

RAILROADS ARE PLANNING another attempt to close the widening gap between rising costs and lagging freight rates. Interstate Commerce Commission is to be told that since 1939 wage outlays have tripled, supply costs have doubled. But rate boosts in the same period averaged only 79 pct.

LOOK FOR CHANGES IN ALUMINUM FOUNDRY TECHNIQUES. One large research unit reports it is on the trail of interesting process improvements which will improve the competitive position of aluminum castings.

FLEXIBLE TUBING INSTEAD OF RIGID METAL DUCTS will be used in a major commercial air conditioning installation. The tubing, a helical wire coil covered with impregnated fabric is reported easier to install, is lighter, requires no soldering.

GETTING THE FACTS ON TAXING AND SPENDING is expected to take several months, Secretary of the Treasury George M. Humphrey told Cleveland businessmen last week. While there will be no quick moves to reduce taxes, Secretary Humphrey did say, "We want a tax reduction as soon as possible."

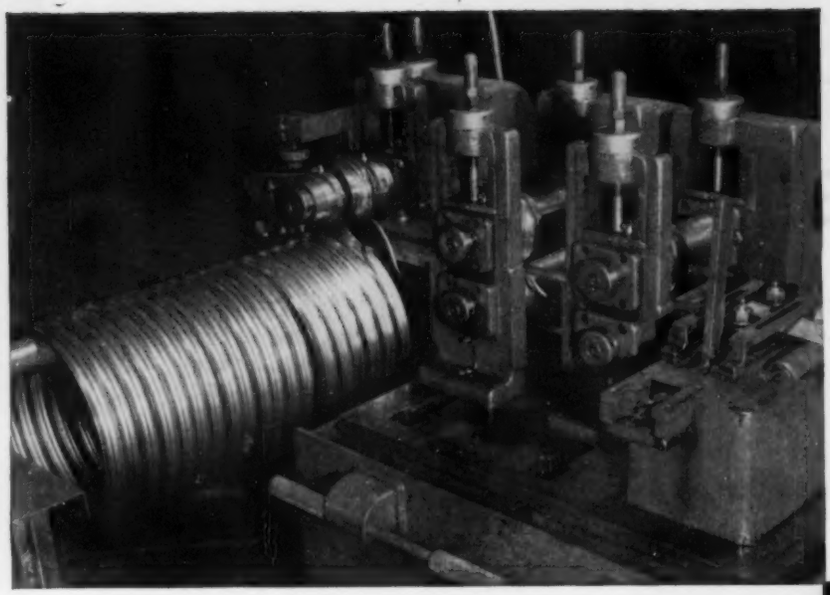
A REFRIGERATOR THAT TAKES A 32-FT WING PANEL has been placed in operation by one big aircraft maker. Used to retard metal hardening, the 5000-cu ft freezer can cool 2500 lb of aluminum from room temperature to -20° F within 2 hr.

VACUUM MELTING OF METALS has reached a point where fairly large melts can be handled. One research company reports its special furnaces can handle melts to 1200 lb for nonferrous, 600 lb for steels and high-temperature alloys.

CONSTRUCTION CONTRACTS OF $11 MILLION-PLUS will soon be let by the Corps of Engineers to cover work at 10 Air Force bases from New England to California. Administration facilities, plane parking, maintenance, warehousing, and aviation fuel storage are planned. The program is designed to aid Air Force reserve training.

A NEW SUPERSPEED CAMERA is reported to have been developed by the University of California's Los Alamos Laboratory. The camera, said to operate at speeds up to 3½ million frames a second is designed for high speed events that are self-luminous or illuminated by intense explosive light sources.

LOOK FOR MORE BI-LATERAL TRADE AGREEMENTS between Europe and the Latin-American countries. Europe's trade there has been slipping for years. European nations see trade agreements as a way to offset dollar payment demanded by the Latin-American nations, and trade manufactured goods for badly needed raw materials.



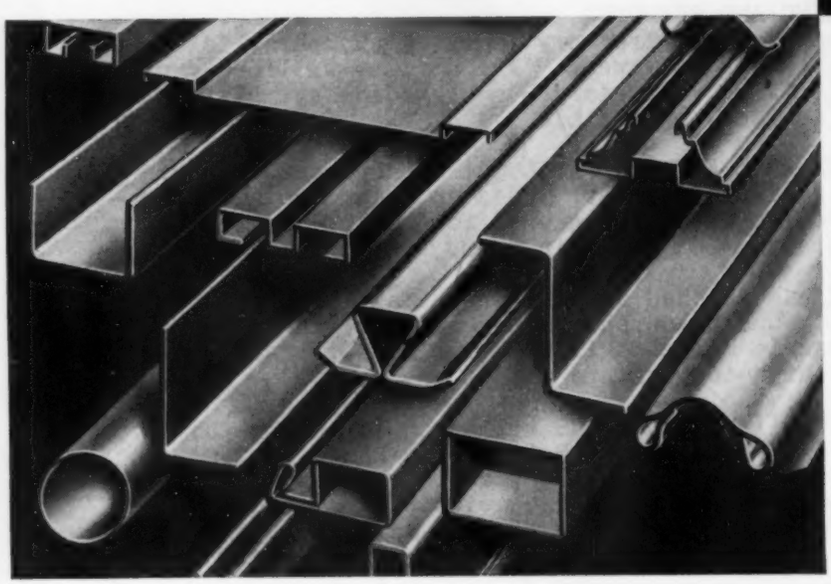
CURVING and coiling to almost any diameter, are two out of many operations which can be performed in a Yoder roll forming machine. As fast as formed, the sections can be continuously coiled and cut to length to make rings for auto hub caps, headlights, wheel trim, stator rings, etc., at a huge saving in cost of materials and labor.

Among other operations which can be tied in with cold roll forming may be mentioned embossing, notching, perforating, welding, flattening, lock-seaming, filling and closing tubular shapes, wrapping, edge trimming, etc.

In the design and assembly of production lines of this character, the know-how of the Yoder engineering staff is at your service. The Yoder book on Cold Roll Forming deals broadly with the most important phases of the subject. Ask for it.

Curving Coiling and Ring Making

IN A COLD ROLL FORMING MACHINE



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JOBS: There's Gold in West for Workers

Western industrial boom continues . . . Rush of migrants fails to meet demand . . . Engineers, machinists, electronics workers most needed . . . Aircraft is biggest field—By *T. M. Rohan.*

The biggest industrial boom in history is still going on in the West.

California's native sons, watching the tremendous immigration into the state last year, often wonder if there are any working people left in the Midwest and East. But industrial personnel men, hard pressed for skilled workers, wonder why more of the people they want don't come out.

Skilled Workers Welcomed

In California especially and to a lesser degree in the other six western states, a good man can find a job quickly. And an engineer, tool and die man or machinist is warmly welcomed, finds plants competing for his services.

Most-needed men, reflecting national shortages, are engineers, tool and die makers, electronics specialists, machinists and top grade sheet metal workers. Companies like Food Machinery & Chemical Corp. which employs only 2000 men at San Jose, Calif., have two fulltime men on the road recruiting skilled help—with only lukewarm success.

Lockheed Aircraft at Burbank, Calif., could put 100 top production and tooling machinists and operators to work tomorrow. Production workers at Solar Aircraft at San Diego making jet engine parts are 45 pct women.

Auto assembly plants have high turnover rates and must train large numbers of all-around men to fill suddenly vacated positions.

Boeing at Seattle hired its 5000th engineer this summer and is looking for more. They will hire 2000 more men before July for production work. There are plenty of ex-lumberjack and farmer applications, but it's hard to find sheet metal men who can work to ± 0.002 in. over a 5-in. length, standard for high speed aircraft.

Steel Goes West

Bulk of western steel talent still comes from the East. When the new Kaiser tinplate mill was started last year many key men migrated, attracted by upgrading and the lure of sunny California.

Nationwide steel firms generally shift men to the West when starting new operations but outsiders are the only alternative for relative newcomers like Kaiser. Local talent is simply not available.

Western workers are traditionally restless. A quarter of Bethlehem's Los Angeles employees give less than a day's notice on leaving. One aluminum rolling mill recently had 50 pct labor turnover in 90 days.

Solar at San Diego with 3000 employees has a severe labor shortage due in large measure to fast turnover. Migrant workers coming from the Southwest make San Diego the first stop.

The firm invests about $200 to $300 training a man. Then after a few months if he leaves without notice for Los Angeles, Solar's investment is lost and the cycle starts again from the beginning.

Los Angeles Is Goal

Mecca for the great migration is still Los Angeles, with the San Francisco bay area second. Estimates of Los Angeles growth vary between 400,000 and 580,000 per year since the 1950 census including births making county population about 4.7 million.

The county leads the U. S. in 6 industries: Aircraft, movies, pumps and compressors, refrigeration equipment, canned sea foods and heating and plumbing equipment. It ranks second in 9 others and third in 12 more.

Aircraft plants are the largest employer not only in southern California but throughout the West as well. They have over 200,000 work-

ers in Los Angeles and San Diego county alone, a third of total U. S. aircraft manufacturing employment.

Over 25 pct of all manufacturing employees in Los Angeles and 75 pct in San Diego work in airplane or parts plants. As early as 1950 the West Coast states' airplane output was $1.5 billion or nearly 2 pct of all U. S. manufacturing.

The six-county San Francisco bay area, although lagging behind Los Angeles, still racked up $170 million industrial expansion in 1952 and expects to top last year by 10 pct this year.

In the area, employment is about 985,000, the larger segments being 205,900 manufacturing, 201,200 service, retail and wholesale trade 233,200, transportation and public utilities 102,000 and government 97,500.

SKILLED MACHINIST W. P. Moyne turns sprocket wheel on lathe in machine shop of Columbia-Geneva Steel Div.'s Pittsburg, Calif., plant. Skilled workers are urgently needed in Western plants today.

Employment for 1953 is expected to be slower than the past 2 years. Shortly after start of the Korean war defense production boomed for a year and a half. This was followed by mushrooming of allied services such as restaurants, construction and retail trade. There is also a long standing shortage of clerical help.

High Turnover

General employment turnover in the area is about 11.5 separations per 100 workers per month and in durable goods manufacturing about 7.2, well over the U. S. average of 4.8. Seasonal peaks and valleys are a strong contributing factor in this area.

Although there were 125,000 shipbuilders made jobless in the area within months after V-J day all have been absorbed into other industries by now.

The leading Pacific civilian shipbuilder, Bethlehem at San Francisco, is now hard put to find experienced shipbuilders for its current $47-million cargo ship building program. Total employment on this will be about 3500.

And the San Francisco naval shipyard is short 250 electronics men for its repair and research projects now underway.

More Farmers

Agricultural employment in the three coast states is still the largest single group at 617,500, with primary and fabricated metals at 142,300, aircraft and parts 229,800 contract construction, 316,700 and lumber and wood products 201,800. Government employees however are 848,600 and service industries personnel 621,100.

In Washington total manufacturing employment is 190,100, up 6700 over a year ago. Principal gainers were aircraft, now 31,200 or 2800 over a year ago; shipbuilding 4900 up 1900 over 1951; metal fabrication 6800, 1200 more than 1951; and primary and secondary nonferrous metals, 8300 or 800 more than a year ago. Mining employment dropped 100 from the 3000 job level in 1951.

Atomic Growth

Besides increases in aluminum plant employment Atomic Energy Commission's Hanford Works at Richland has 3000 construction workers on its payroll on a $110-million expansion program. Thousands will be added as work progresses. In-plant employment is about 9000 (including 100 Ph.D.s) and expected to grow.

The A.E.C. Arco, Idaho plant also employs 2500 in a $26-million project to use nuclear energy for industrial power production and uranium recovery. A new $33-million aircraft reactor program will boost construction employment there to 1700 by fall.

In Oregon, manufacturing employment dipped 5600 last year but was offset by a 7400 gain in service, transportation and government activities pushing the total up 1300 to 455,300. Unemployment is the highest in years due to more workers than jobs.

Utah currently has 222,000 non-agricultural employees and is short 5700 workers including 1100 skilled ordnance men, machinists, boilermakers, welders, aircraft and auto mechanics and 1000 sales and clerical employees.

Mushrooming

Arizona's employment is mushrooming for that area. Total non-agricultural employment is 210,000 or 10.1 pct over a year ago. Manufacturing employs 30,600, up 20.9 pct and includes 4500 in primary metal industries and 17,800 in various minor activities.

Primary metal employment went up 105 pct in a year due to titanium and copper activity. Copper mining employs 11,000, up 6 pct in a year but low market prices for lead and zinc have dropped mine employment 25 pct to 1500.

Nevada still has 9300 hotel, amusement and recreation employees compared to only 3800 manufacturing and 3100 mining but the latter classes showed 7 and 5 pct gains respectively last year.

Total for all employed is 64,150 including 12,300 government, 4850 railroads or 6 pct over 1951.

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INCENTIVES: Supervisors Get Them Too

Westinghouse uses award system on management level . . . Paid $7 million to over 6000 employees in '52 . . . Establish general areas of accomplishment to qualify—By *J. B. Delaney*.

Are you getting the most out of your management team?

If not, you'll be interested in what Westinghouse Electric Corp. is doing to (1) to reward the workers, and (2) prod the drones.

Westinghouse has a management incentive plan. "Incentive" is the word. It's not a bonus system. To get a cut of the melon an eligible employee earns it. He could get it one year and not the next. And the better the job the bigger the slice.

Paid $7 Million

Westinghouse paid out nearly $6.3 million in 1951 under this plan. Close to 6000 employees participated. Payments for 1952 were about $7 million to a somewhat larger number of participants.

That's the beauty of the plan. It has a broad base. It's not limited to a chosen few. The base may be broadened even further. But at the same time, Westinghouse will take a closer look at the performance of those recommended for a piece of the pie.

No Cure-All

How successful is it? Westinghouse isn't kidding itself that the system is a cure-all. It's hard to tell. Was the outstanding job that Frank Smith did last week due to the incentive plan? Or would Frank have outdone himself anyway? Westinghouse doesn't know.

But the company feels this way: Give a man a chance to earn a special reward and he'll do a better job. Westinghouse is satisfied the plan is a good investment.

How It Works

Eligible to participate in the Westinghouse plan are officers of the company, staff executives, department managers, division and district apparatus managers, general managers of subsidiary companies, department heads, supervisors or foremen, and others in policy-making jobs.

Westinghouse has laid down broad fields of accomplishment for determining when a man is eligible. These include (1) service and accomplishments beyond the call of ordinary duties, (2) development of subordinates, (3) training of replacements, (4) development of sound employee relationships, (5) planning, (6) devising new and improved methods, (7) cost reductions, (8) cost or expense control, (9) inventory control, (10) quality control, (11) production scheduling.

An incentive compensation committee composed of board members not eligible to participate in the plan is the supreme court in reviewing employees' awards.

Amount to be divided does not exceed 5 pct of the consolidated income of the company and its subsidiaries before taxes in any one year, plus any unused amounts carried forward from the previous year. Nothing will be paid in any year unless cash dividends of at least $1 a share are paid on the common stock. Payments may be made in cash or part cash, part common stock.

The management incentive system is in addition to Westinghouse's plan of rewarding its engineers for outstanding inventions. Called the "Most Meritorious Disclosure Award," the recently installed plan has brought awards of $5000 to at least four Westinghouse engineers, and innumerable lesser awards, including one of $3000, to many others of the staff.

And of course Westinghouse has its broad general employee suggestion award system to promote alertness on the job and result in cost savings for the company. The payoff for ideas benefits management and workers.

How Supervisors Earn More

New Snake at Studebaker

In the process of bringing out a radically new car design this year, Studebaker Corp. added a streamlined body and materials conveyer system at its South Bend plant.

The serpentine conveyer system snakes its way from the body plant to final assembly. It starts at the sixth floor of the body plant, crosses a public street at third-floor level, and extends over or through seven buildings.

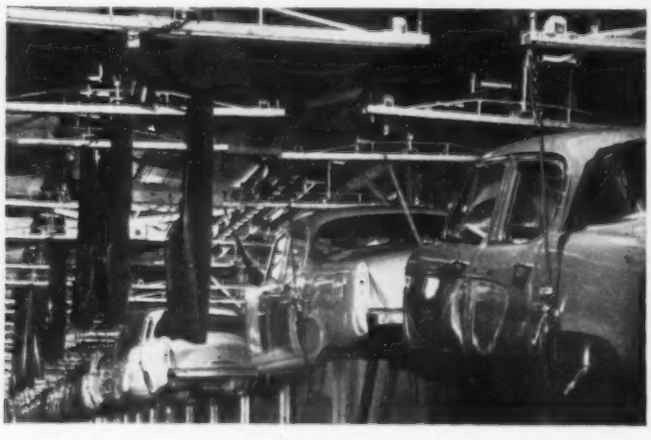
Constructed by Anchor Steel & Conveyer Co., Detroit, at a cost of $625,000, the 5310-ft conveyer serves a double purpose. In addition to increasing Studebaker's manufacturing efficiency, it also relieves traffic congestion on the thoroughfare near the plant.

Formerly, finished bodies were transported across the street by specially equipped truck trailers.

TRAFFIC JAMS are avoided at this point because Studebaker's new conveyer system crosses busy Sample St. at third floor level.

TWISTING and turning its way, the more-than-mile-long 17 x 10 ft conveyer enclosure was routed through buildings wherever possible.

END POINT of the conveyer is at the body plant where finished bodies are loaded. Self-adjusting hooks pick up bodies from dollies.



INSIDE view of the conveyer housing shows Studebaker fenders (left) being carried to the body plant on the conveyer's return trip.

FINISHED BODIES are dropped through an aperture above the final assembly line and are matched with a previous line setting of chassis.

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OIL WELLS: Can Sink 50,000 in '53

PAD goal for current year was 55,000 wells . . . But with or without controls, oil men won't get that much steel . . . See 22 pct increase in oil country tubes—By *Karl Rannells.*

Recent tabulations by the Iron and Steel Div. of National Production Authority indicate that oil men—with or without controls—won't get as much steel as they want this year.

Figures collected by NPA indicate that new steel capacity is coming into production at a rate which will assure a 22 pct increase in output of oil country tubular goods.

Can't Hit Target

This indicates that while the oil country operators will probably be able to get as much casing and tubing as may be needed a year from now, drillers will not be able to meet the 1953 goal established by the Petroleum Administration for Defense

This was 55,000 wells. Indications now are that no more than 50,000 holes can be sunk. Nearly 46,000 were drilled during 1952.

Based on estimates from steel producers, the government figures it this way: Increased ingot production and the ensuing diversion of steel from less sought-after products will bring a marked boost in the supply of oil country goods.

Tonnage Outlook

Pinned down to actual figures, the government estimates for oil country goods for 1953-55 are:

For 1953—1,896,000 tons from present capacity, 194,000 from new facilities and 125,000 from conversion operations, a total of 2,215,000 tons.

For 1954—2,134,000 tons from existing capacity and 504,000 tons from new capacity, a total of 2,638,000 tons.

For 1955—a total of 2,747,000 tons from all sources.

Meanwhile, although the oil industry is continuing with its expansion programs for production of crude and refining operations, the increasing output is creating a new problem—an excess of fuel oil.

It is reported by the Bureau of Mines that both residential and commercial users are turning in ever increasing numbers from solid fuels to gas and fuel oil for heat. Solid fuel, mainly coal, furnished 80 pct of all heating in 1935, but only 43 pct in 1951.

At the same time, use of oil heating — residential and commercial but not including industrial—rose from less than 9 pct to more than 25 pct of the total.

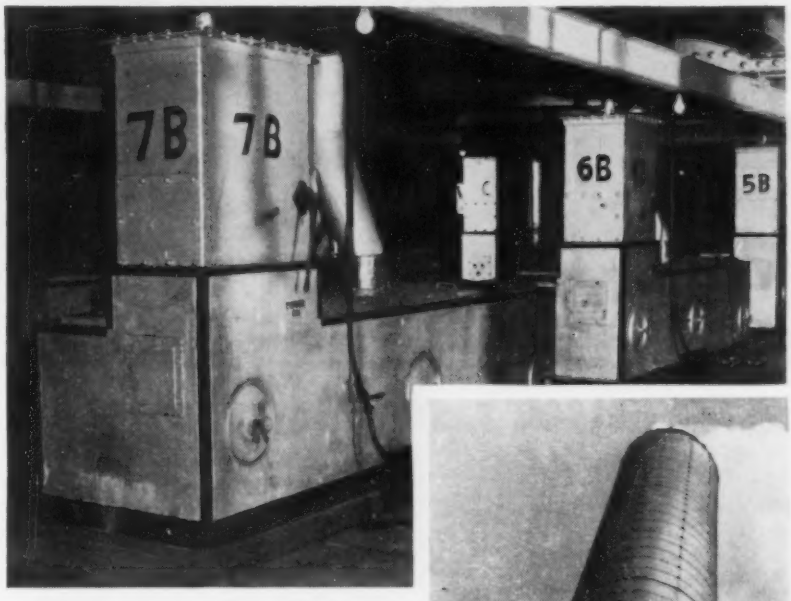
Despite this big switch from coal, the supply of fuel oil continues to pile up. Partly as a result of a relatively mild winter, the oil industry is facing summer with a larger than wanted inventory.

High Enough Storage

This brings up the question of whether the expansion of storage facilities has been set at a sufficiently high point—a total of 1,250,000,000 bbl, exclusive of retail facilities, by the end of 1953.

Even more interesting is the talk that the oil industry may throw its weight behind manufacturers of oil burning equipment in the promotion of a drive for customers and increased fuel oil use.

Salvage



Nickel, Copper, Grabbed from Air

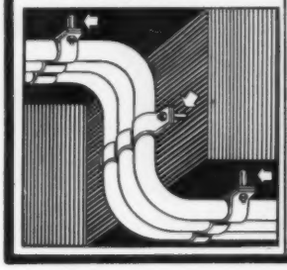
Nickel and copper are snatched out of the air at Copper Cliff, Ont., where International Nickel Co. of Canada, Ltd., operates a smelter.

Furnace dust containing metal particles is recovered by a Cottrell precipitation plant. As smelter gases pass through flues on the way to the 500-ft smoke stack (right) dust particles are electrically charged by wire curtains hanging beneath insulator boxes (above). The dust sticks to grounding rods and is later knocked off and re-enters the smelting process.

END-WELDS STUDS TO STEEL IN A SPLIT-SECOND
ELIMINATES DRILLING, TAPPING, HAND WELDING
REDUCES MATERIAL HANDLING—TAKES THE TOOL TO THE WORK
SAVES STEEL—ELIMINATES HEAVY BOSSES AND FLANGES
IMPROVES PRODUCT DESIGN AND QUALITY
TAKE ADVANTAGE OF
NELWELD COST SAVINGS
IN STEEL FABRICATION

TO HANG....TO HANDLE....TO HOLD..

Faster installation of brackets or hangers for piping, tubing or conduit.



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NELSON STUD WELDING

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—Metallurgy—

TUNGSTEN, MOLY:

DMPA lifts need for allocation to buy, ship U. S. tungsten, moly.

You no longer must get a government allocation to buy or ship domestic tungsten and molybdenum concentrates, Defense Materials Procurement Agency has ruled. But you still need an allocation to buy imported tungsten through the General Services Administration or to export molybdenum.

Throwing domestic trading in these materials back on the free market doesn't necessarily mean they are in abundant supply. Instead, the agency says, this has been done to conform to the administration policy of lifting controls as soon as possible.

Tungsten Output Upswing

From the other side of its mouth the agency says it doesn't see much cause to worry about the tungsten supply at the moment although the bulk of domestic production finds a ready market.

Figures show that domestic production of 60 pct tungsten concentrates increased last year from 1403 tons to 1738 tons per quarter.

Continued high domestic production is forecast, as the government is still committed to guaranteeing a floor price of $63 per unit for as much as 29,000 tons. So far, it has had to buy less than 1000 tons at this price.

As for molybdenum, production of moly concentrates has increased from 9,850,000 lb of contained molybdenum per quarter in 1951 to more than 13 million lb in late 1952.

Foreign Needs High

Allocation authority is retained over "moly" exports because the U. S. produces more than 90 pct of world supply and foreign requirements are still in excess of the available supply after domestic needs are met.

Also, DMPA explains, such authority is still retained over government-imported tungsten because certain of the purer imported tungsten concentrates are still short.

Authority is also retained to issue special directives for the delivery of tungsten ore and concentrates when necessary.

UNIVERSITY OF MICHIGAN LIBRARIES

MILITARY: Industry Aids Top Training

Knowledge of industrial workings is vital to military logistics ... High level service school hears visiting civilians lecture on production, transportation—By R. M. Stroupe.

Top level military men must know more than battle tactics. They have to know what kind of industrial support they can expect and how best to use it.

Management and labor have both shown a readiness to assist in this type of teaching at the Industrial College of the Armed Forces. ICAF trains selected armed services officers in the rank of lieutenant colonel and colonel (or Navy equivalent) for key command, staff, and planning duties in the military establishment.

In addition the college prepares about ten federal civilian employees per year for industrial mobilization planning jobs in their respective agencies.

Business, Labor Called On

Civilian lecturers are no rarity at ICAF, located at Ft. McNair in Washington, D. C. They have backgrounds in science, education, transportation, communications, distribution, government, and production of goods. They are leaders in their chosen professions.

Management and labor first helped broaden the scope of instruction when the ICAF predecessor institution, the Army Industrial College, was teaching its first nine students in 1924. Some of the problems studied by members of this initial class were "Balanced Production," "Power Problems During the World War," and "The War Industries Board."

By the time the third class of senior officers was enrolled, students were being furnished a comprehensive program of conferences and lectures by a small faculty and visiting civilians. As the class was graduated, the College awarded Honorary Adviser certificates to a group of men who had made special contributions to national defense. In the group were Charles G. Dawes, Bernard Baruch, and Walter S. Gifford.

A check of the current ICAF board of advisers shows a sizable business and industry representation. On the roster are such men as R. E. Gillmor, vice-president of Sperry Corp.; Henry F. McCarthy, vice-president in charge of traffic, Seatrain Lines, Inc.; William M. Allen, president of Boeing Airplane Co.; and Alexander R. Heron, vice-president of Crown Zellerbach Corp. The latter two are recent appointees.

From these executives and from a dozen counterparts in other fields comes guidance that helps ICAF perform its mission.

Under over-all direction of the ICAF Commandant, Rear Adm. W. McL. Hague (USN), the faculty outlines problems the U. S. would face in mobilizing national economy for war. It presents figures on resources and productive potential of free-world and Communist-bloc areas and points out how this country and friendly nations can join for mutual defense.

When techniques of teaming industry and military forces for warfare are studied, the role of the visiting speaker becomes particularly important.

ICAF students this year found on their schedule of conference titles "Economic Mobilization Since Korea," "Facilities For War Production," "Industrial Manpower Requirements," "Materials for the Production of Steel," and "Management Controls."

They will follow up their classroom and individual-study work this spring by going, in small groups, on trips to see steelmaking operations, aircraft and tank plants, ordnance works, tire factories, mines, and power stations. These tours, lasting 4 or 5 days, are in addition to other shorter trips arranged in the Washington area.

To present the nucleus of its material to civilian leaders and to reserve and National Guard officers, ICAF opened its field economic mobilization course in 1948 and backed it in 1950 with a correspondence study course. About 18,000 persons have completed the 2-week field course, while some 2400 are enrolled for correspondence instruction.

Excellent response has been given the field course, a condensed version of the resident course, taught by instructors assigned from the ICAF faculty.

INSTRUCTORS in the field economic mobilization course of the Industrial College of the Armed Forces look over a gas turbine engine at Boeing Airplane Co.'s plant, Seattle. Left to right: M. J. Boston, Boeing; Col. Alvin Glafka, USA; Earl S. Bigler, manager, Seattle-Tacoma airport; Col. James E. Reilly, USAF; and Capt. Terrell A. Nisewaner, USN. The three military men instructed in the field course conducted in Seattle.

STEEL: How Firms Plan for Profits

Pittsburgh Steel president tells all—about economic factors in expansion decision . . . Market studies showed the way . . . Result was building of practically new company.

Pittsburgh Steel Co. is on the last lap of an expansion program that will have boosted its finished steel capacity more than 80 pct in 3 years.

Avery C. Adams

Biggest feature of the big growth is the company's spurt into the sheet and strip business with a capacity of 600,000 net tons per year.

When the program is completed at the end of this year the firm will have accomplished the following:

(1) Increased blast furnace capacity by 12 pct.

(2) Increased openhearth capacity by 50 pct (at cost of $16.31 per annual ton).

(3) Increased finishing facilities by 82 pct.

Why did the company's directors decide to embark on such an ambitious program? What market factors influenced them? What prompted their entry into the sheet and strip business? How did market research help them chart their course?

Frank answers to these, and other interesting questions were given by Pittsburgh president Avery C. Adams before the New York Society of Security Analysts last week. Here are some highlights from his remarks:

Need Finishing Facilities

If a steel company is to be a success and generate consistent earnings, it must (1) keep its finishing facilities adjusted to market demand for relatively more profitable products, and (2) keep finishing facilities in excess of ingot capacity, so it can capitalize on sudden changes in demand for mill steel products.

Though now moving toward a definite objective, Pittsburgh Steel has had a deficit of finishing facilities instead of an excess. It has been long on pig iron in relation to its ingot capacity, and long on ingots in relation to its finished product capacity. Net result: An unprofitable product mix with one-third of its steelmaking capacity for sale as ingots, for which there is no demand except in periods of short supply.

Gives Company Economics

In today's market the company can operate at capacity, selling its surplus ingots for conversion. But, when demand eases slightly and ingots aren't wanted for conversion, Pittsburgh Steel's openhearths operate at only 66.7 pct of capacity—even though the industry may still be close to 100 pct on an overall basis.

If the industry operates at 70 pct of capacity, Pittsburgh Steel can operate at only 47 pct.

This explains the company's erratic earnings record and emphasizes its No. 1 problem—deficie... in rolling and finishing facilities.

Facing this problem in 1950, ... first step toward solution wa... study of market trends to det... mine whether to expand existi... wire and tubular finishing fac... ties or work toward diversifi... tion by entering new product m... kets—always somewhat a gamble.

Sheet, Strip the Answer

The answer was soon obviou... the accompanying chart sho... market limitation of a compa... making only wire and tubul... products. It also shows the ba... trend in demand for hot and col... rolled sheets and strip—faste... growing product market in the i... dustry at the present time.

Measured by current industr... shipments the market for hot an... cold-rolled sheets is 20 millio... tons per year. Though Pittsburgh... 600,000 tons' capacity is a bi... jump, it represents only 3 pct o... the total market. The company... share of the tubular market is 1... to 12 pct; it sells about 7.5 pct o... the wire product market.

Steelmaking capacity in th... Pittsburgh district, which ac... counts for 39 pct of the nationa... total, has increased 25 pct fro... 1940 to 1952.

Reach for Markets

The company plans to ship ... substantial part of its productio... out of this excess steel producin... area, supplementing rail ship... ments by truck and barge. If it... becomes necessary to absor... freight to be competitive at vari... ous points of delivery, competitors... will be in the same boat.

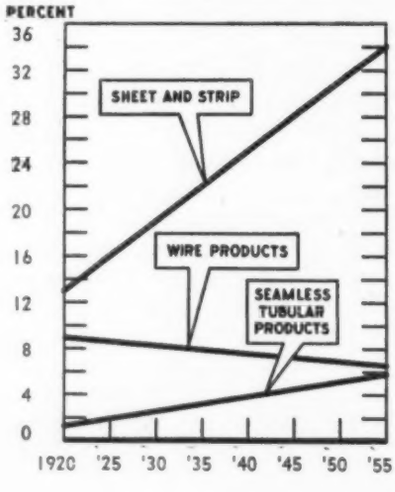
Further study indicated instal... lation of a continuous 66-in. hot... and cold-rolled sheet and strip... mill would make it possible to... solicit 78 pct of the sheet and... strip market. Steelmaking facili... ties had to be expanded to effec... tively utilize total productive capac... ity of such a mill.

The result was the building of... what amounted to a new steel... company.

In August of 1951, Thomas Steel...

Shipments of Selected Items

(As Pct of Total Finished Steel Shipments)



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Co., Warren, Ohio, was acquired by exchange of stock. This company, now operated as a division of Pittsburgh Steel, is a non-integrated producer of cold-rolled strip, most of which is coated electrolytically with copper, zinc, nickel, chromium and other nonferrous metals.

After completion of the present program—with its new flat-rolled products as a base—the firm will consider production of such specialty items as electric-weld tubing, electrical sheets and strip, stainless sheets and strip, hi-tensile low alloy sheets and formed sections for future marketing.

Breakeven Point

Mr. Adams warned against placing too much emphasis on trying to determine break-even points in the steel industry. He pointed out that they have varied to such an extent as to have little practical value. Variations are the result of fluctuations in costs, operating rates, daily changes of product mix, and price adjustments.

He did offer that his firm's breakeven point in 1952 was 55 pct of capacity in terms of tonnage and 58 pct in terms of sales dollars. Then he cautioned. "In my opinion these figures have no significance because conditions can and do change so rapidly, and to such an extent, that they are meaningless. . . I could not tell you what our breakeven point will be next month unless you could tell me what our costs, operating rate, product mix, and prices will be at that time.

It's Higher Today

"In 1931, certain steel companies broke even at an operating rate of 38 pct of capacity. But, with the cost increases that have since taken place, it follows that the industry's breakeven point is higher today than it was then.

"When the going is tough, however, we have found ways and means to cut our costs. I think it is significant that no integrated steel company has ever gone through bankruptcy."

Materials Handling

Lift Trucks Play One-Night Stands

Take-it-to-the-customer got a big play from heavy industry in Miami, Fla., this week. Yale & Towne Manufacturing Co. started on the road there a traveling materials handling equipment show.

Two trailer trucks will carry a variety of trucks and hoists to prospective customers in the U. S., Canada, and Mexico. Show will be on the road 2 years, travel an estimated 25,000 miles.

In each city the local Yale & Towne distributor will help in running the show and act as host to local industry leaders. This arrangement allows sales personnel to stress equipment and applications they know to be of special interest in their particular areas.

Yale & Towne felt the expense and trouble of the show is justified by the need to bring modern materials handling equipment and methods to businesses and communities who may not yet be aware of specific capabilities of such equipment.

In discussing the show, Elmer F. Twyman, vice-president and general manager of the company, pointed out that many businesses are caught in the squeeze of a depleted labor reservoir and steadily rising operating costs.

"In many cases," Mr. Twyman stated, "modern materials handling machinery is the answer—and the only answer to this problem."

Equipment demonstrated includes fork-lift trucks, both gasoline and electric powered, chain hoists, pallet trucks, hand trucks, and special attachments. These include carton clamps, drum attachments, hydraulic pushers.

Seven men are needed to put on the show. Two specially constructed trailer rigs pulled by an International tractor and a Dodge are used to transport the show. In addition to the materials handling equipment, music and movie equipment, chairs for spectators, generators, battery chargers, promotional material and a pavilion tent are carried.

Picture shows demonstrator backing loaded fork lift truck up ramp into trailer preparatory to moving show to new location. Ramp was specially designed to load the 16.5 ton trailer.

Interior of one trailer is designed for showing movies of materials handling equipment actually in use in different industries. Furnishings are suitable for entertainment after screenings.

NONE BETTER... America's First and Safest

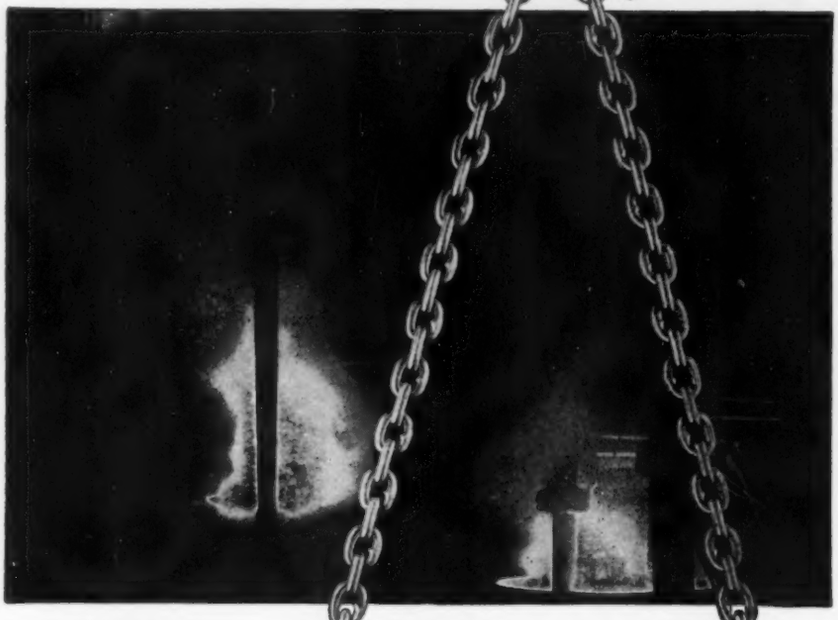
HERC-ALLOY

SLING CHAINS

STRENGTH—Size for size, no other sling chain offers a greater tensile strength. HERC-ALLOY will not crystallize—never requires annealing.

SAFETY—HERC-ALLOY Sling Chains are made to your specifications. Every new sling carries a written guarantee, is registered and tested before shipping. This registration serial number is carried at the top link.

● Serial number permanently affixed near top link for positive identification.



● Identify HERC-ALLOY by the patented Inswell side weld with the extra swell of metal on the inside of the link.

EFFICIENCY—Lighter, stronger HERC-ALLOY Sling Chains feature the exclusive short, narrow link design which holds firmer, less tendency to kink, less gouging. Workmen handle HERC-ALLOY with less effort.

PREFERENCE—Men who buy and use sling chains are influenced only by facts learned through experience. HERC-ALLOY Sling Chain preference has been built up over the years, not just by what we say, but by how HERC-ALLOY performs on the job.

Write for Data Book No. 3 which contains much useful manufacturing and application information on HERC-ALLOY Sling Chains.

COLUMBUS McKINNON CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corp.)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

District Offices: **New York • Chicago • Cleveland**

Other Factories at Angola, N. Y., Dixon, Ill., St. Catharines, Ont., and Johannesburg, South Africa.

BENEFITS: Change

Knotty problems: who to cover, how to pay . . . Ideas numerous in and out of Congress.

Proposed social security legislation is plentiful. Too plentiful—for it fails to give a firm line on what employee groups might be brought under coverage by the 83rd Congress. Also remaining to be solved is the problem of paying for benefits to workers who may be added to the plan and who are non-contributors to the federal insurance reserve fund. What may slow up changes in the social security law is the House Ways and Means Committee insistence on a comprehensive plan instead of piecemeal legislation.

An Early Start

Dozens of congressional proposals have been made, some even before President Eisenhower called for broadening social security coverage in his State of the Union speech. Senate Majority Leader Robert A. Taft, R., Ohio, has been at work on a proposal that is almost certain to gain ample support. Consideration has been given to the overlapping of federal, state and local activities.

Added to congressional concern over social security is the outspoken interest of sizable groups in and out of government. The U. S. Chamber of Commerce, Congress of Industrial Organizations, and Social Security Administration have had something to say.

In a national referendum, Chamber members voted 16-to-1 for widening the existing program to take in all workers and all retired persons. The Chamber also favors scrapping of federal subsidy for state relief for the aged.

But CIO contends that acceptance of this plan would "do more harm than good." In particular, the labor group disagreed with cutting off federal grants to the states for pension use.

Social security officials are in general accord with the Chamber that the federal program should be extended to some 5 million aged

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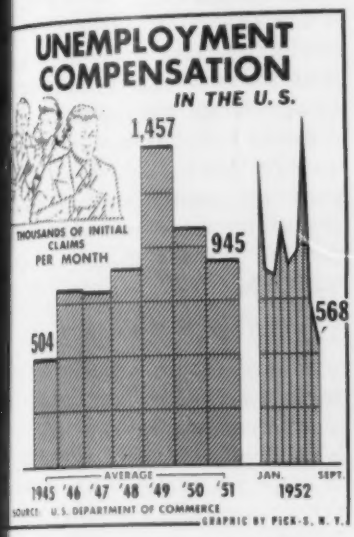
ocial Security Law

eople who do not qualify under he existing law. This includes re-ired workers past age 65, their ives, and parents and widows of etired workers. Most of them get elief checks, amounting to more



than $2 billion per year, from the combined federal-state program of old-age assistance.

Payment of benefits from social security receipts to non-contributors would bring additional problems. There is, for example, the reserve fund, now amounting to about $17.5 billion. SSA says that in 40 years the fund will have to be $100 billion.

A "Cushion"

Dean Mitchell of the Chamber's social legislation committee has made clear that he doesn't believe the reserve fund should be regarded as the answer to future requirements. He defined the fund as "more of a cushion than a reserve in the actuarial sense" and said it "will not be adequate to meet the demands against it."

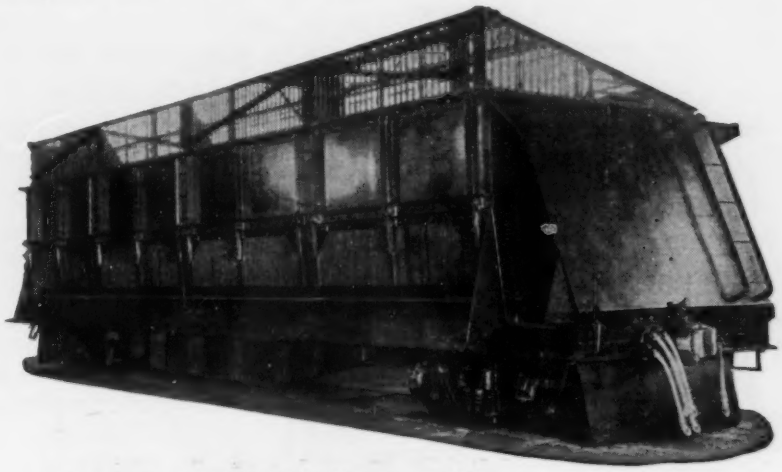
The Chamber advocates payment of benefits from each year's tax receipts. Estimated intake this year is $3.9 billion.

One fact remains unaltered—on Jan. 1, 1954, unless there is a change in the law, the rate will become 2 pct for employers and employees, and 3 pct for the self-employed.

50 Years of KNOW-HOW

ATLAS CARS

For more than 50 years Atlas has been designing coke oven machinery of acknowledged excellence. Coal Charging Cars, Coke Quenching Cars, Door Extractors and Coke Guides *must* be built with "know-how" to produce best operating results and lowest maintenance. Let Atlas quote on your needs.



COKE QUENCHING CAR

The latest Atlas Quenching Cars have longer life with lower maintenance than previous types. Their cost also is lower. This is due to the welded "corrosion-resisting" frame of heavier material with fewer joints and all joints weld-sealed together with the use of abrasion resisting floor plates, which outwear cast plates and cost much less to replace. There is no welding on Atlas abrasion resisting floor plates. The improved door operating mechanism is sealed against the entrance of coke dust and water and is simplified to eliminate the troublesome line shafts. Coke deflectors are provided at each end. Air hoses are armor-clad. Gates generally are of steel bars arranged for easy replacement. Cars are supplied with or without upper coke racks.

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APPLIANCES: Trade Winds Blow Briskly

Home equipment makers look for high sales rate in first 6 months of 1953 . . . Plan higher output to meet expected demand . . . Distributor outlook bright—By K. W. Bennett.

Because the American housewife is still buying their products in large numbers this month, home appliance makers are betting that this brisk tempo of sales will continue, at least through the first half of 1953.

The sales rate continues to climb. After hoisting themselves out of a slump since mid-1952, producers have felt only one temporary falter in sales volume last November. And now they are counting on a competitive but good market in which each one is inclined to place his slice of the housewife's dollar at something above the industry average.

One producer will expand his total output by 30 pct and figures that his sales for the year will be up 25 pct. January and February shipment figures tend to bear this out. Another will boost washer output by 10 pct.

A third plans on a 30 pct increase in freezer and refrigerator production during his fiscal year.

One sales chief has declared with high hope that his output will rise by 50 pct. This was the highest figure quoted. Conversely, one estimate for the industry generally put the climb in washing machine sales during 1953 at 5 pct, dryer sales at 28 pct. If this proves correct somebody is going to have to give.

Yet optimistic estimates of sales are being backed with capital investment dollars. Fully committed and expected to be in production by year's end are at least one new refrigerator plant, new factory space for home laundry equipment, an expansion by an appliance maker into room air conditioning, and still another refrigerator plant expansion.

The distributor outlook is considerably improved. Inventories that bulged last spring, when some appliance manufacturers were cu ting their work week, have be reduced. The end of Regulati W (restricting credit) was a he And one firm has estimated th 36 pct of its washer output wi go to families having incomes b low $4000, which will help be sales considerably.

With sales prospects improv appliance makers are again bu tling for steel with not much rel being offered. Getting carbon bar drawing quality steel, enameli quality steel, cold-rolled she generally, seamless tubes, faste ers, aluminum components is sti decking purchasing agent's brow with cold sweat.

Buying Expensive Steel

A large Midwest consumer re ports his steel quotas for secon quarter in cold-rolled sheet hav been reduced substantially. Ther is still considerable use of co version and spot buying of highe priced steel. At least one larg company is crowding for secon quarter conversion space.

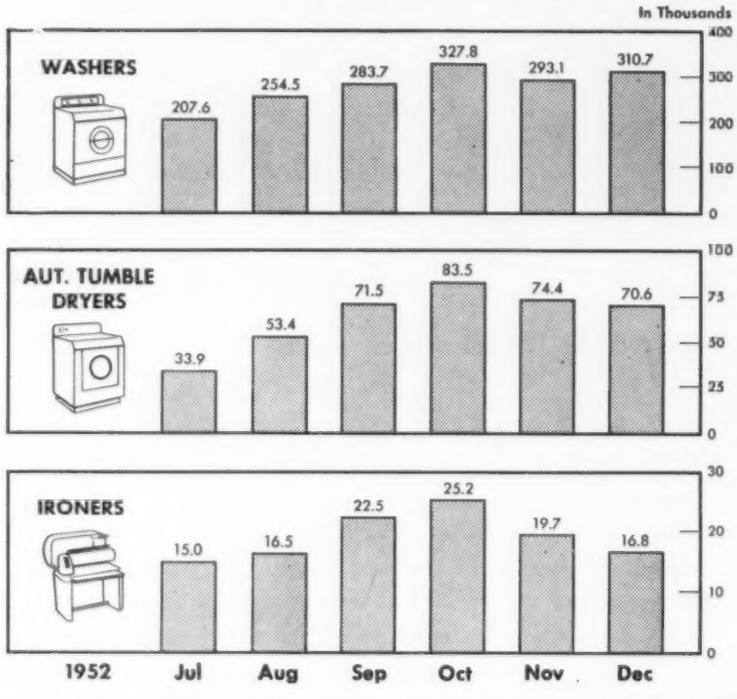
A second, while avoiding co version, is spot buying in expen sive steels and hoping the short age will die by the end of th second or third quarters. Thei reasoning: Better to pay more fo steel temporarily than be boun in long-term and expensive co version arrangements. Some for eign material is still being pur chased through small domesti warehouses. Although foreig steel prices have dropped, thi steel is still high cost.

Hold Line on Prices

Sales forces are digging in fo action and prices are expected t hold at current levels. There hav been some reductions, but thes are not regarded as a genera trend, and producers are counting on holding consumer price level into at least second quarter.

Talk of a softening fall market is not widespread and the immedi ate future looks solid. One Mid west distributor hit record sales in January on refrigerators and washing machines. He's counting on good sales to July.

Last Half Appliance Output



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PRICES: Metals Ceilings Linger Longer

Decontrol of steel, copper, aluminum may come about Apr. 1 . . . Decision to do so will come from above OPS' head . . . Copper decontrol poses special problems . . . What's free.

Removal of price ceilings over steel, copper, and aluminum should take place around Apr. 1, if the government current decontrol timetable holds together that long.

As of this week, the Office of Price Stabilization had jettisoned nearly all control orders applying to consumer goods. But ceilings on the three basic metals, plus those on nickel, apparently are slated to stay in place for another 30 days.

Evidence gathers that the decision on the time for decontrolling steel, copper, and aluminum prices will be handed down from a level higher than the official price-controls agency.

From OPS came no open prediction of a date when primary copper would be freed. Nearby, in National Production Authority, officials were saying allocations of copper raw materials for March are all set, on the assumption that price curbs would be continued through that month.

Copper Baffles Agencies

Each agency insists the problems of copper controls are more baffling than those on steel and aluminum, because so great a quantity of copper is imported. Neither can say definitely, though, when price restrictions on the three metals will be dropped.

Spokesmen for domestic primary copper producers have been urging that the government immediately shelve price ceilings on all copper and copper products. Removal of controls on copper scrap (THE IRON AGE, Feb. 19) while limitations are kept on refined copper has resulted in a "chaotic condition" they say.

This confusion has been acknowledged unofficially by OPS. A source close to the agency said recently that attempts to continue ceilings on brass mill products and copper-containing wire and cable looked unworkable.

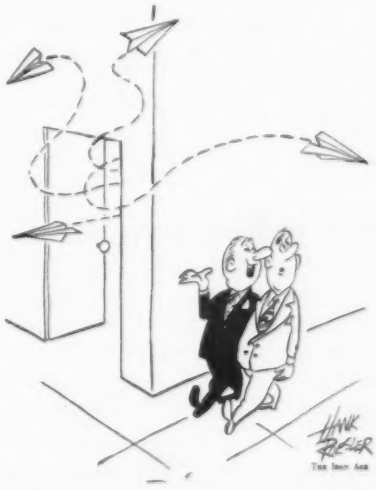
Brass mill industry representatives concurred last week, pointing out that ditching of controls on copper scrap has failed to make more scrap available. Their operations could be shut down if this shortage continues, they said. Like primary producers, they have made a strong bid for freeing all forms of copper from price barriers.

13 Pct Still Captive

Contents of a decontrol package announced Feb. 18 ranged from farm machinery and equipment to vacuum cleaners and radio parts. The move left only 13 pct of items in the government's cost-of-living index still under ceilings.

Controls were retained on refrigerators, farm and home freezers, domestic dishwashers, clothes washers, dryers, and ironers, food waste disposers, industrial-type sewing machines, water heaters, and ranges. Miscellaneous hardware items also remained under OPS limitations.

Released in last week's package were such restricted-use vehicles as fire trucks, hearses, ambulances, motorcycles, and motor scooters.



"Let's drop in on Simpson . . . claims he has a new way of expediting paper work."

Joining the growing line of decontrolled items were coal and all other solid fuels; lumber and wood products; most consumer, commercial, and industrial services; transportation, storage, dock, warehousing, and terminal fees; brokerage fees on exempted commodities; business machines; industrial, scientific, and technical glass products; and structural glass, masonry, roofing, and insulating materials.

Most significant major category in the third decontrol list was the industrial materials and manufactured goods line. In addition to items previously listed are locomotives, rail passenger and freight cars, and certain rail equipment, parts, and accessories; certain fans and blowers; manual and power-operated tools; fireclay, dolomite and magnesite (including dead-burned); trailer coaches and house trailers; oil-well and oil-field machinery and equipment; food products machinery; mining and quarrying machinery; rolling mill machinery and auxiliary equipment; certain textile machinery, parts, and accessories; and materials-handling equipment.

STEEL CMP:

Industry reps ask NPA to clear air by fixing controls end definitely.

Declaring that steel is no longer a critical commodity, representatives of 25 steel producers told National Production Authority to announce immediately that effective July 1, production directives on steel will be strictly limited to military and AEC needs.

One Package Decontrol

To clear up confusion that is boiling up, the industry reps asked NPA to put all decontrol actions into one package. Reasons for the need to immediately announce a clear policy to follow the expiration of Controlled Materials Plan on July 1 was that the recent open-ending of CMP does not make clear what should be done with advance allotments beyond June 30.

Nor does it clarify what should be done about acceptance of or-

ders on long lead time products for which the production time spills over into July.

A steel industry task committee should be set up to assure that any emergency military needs are met fully and promptly, the industry recommended.

Backing up industry's contention that steel is not critical, it was reported that with completion of first quarter rollings, about 95 pct of the materials for the industrial expansion program will have been shipped.

What Was Proposed

Specific recommendations which NPA promised to "take under consideration":

Immediate announcement that, effective July 1, production directives on steel producers would be strictly limited to requirements for atomic energy and military needs, including allocations to further converters.

Immediate announcement of revocation, also effective July 1, of all other regulatory controls on production, distribution, use, and inventory of steel mill products.

Authorization of the use of the allotment symbol "B-5" by "B" product manufacturers to assure deliveries of steel after June 30 to meet production schedules for military orders.

Steel for Defense After CMP

Plans are being worked out for meeting military and defense materials requirements after CMP expires June 30 and will be announced upon completion, industry was told last week.

In addition, National Production Authority emphasized that manufacturers of "B" products are not to file applications for third quarter allotments.

Nor are they to file for second quarter supplementary allotments unless materials are needed for military production or atomic energy needs.

In such case, NPA said, the proper procedures are spelled out in Dir. 20 to CMP Reg. 1 issued Feb. 16.

Digest of Industry Controls

Automotive—Amend. 7, Rev. 1, CPR requires automobile manufacturers to take into account original tooling costs of cars now in production when using these units as a basis for computing ceilings on comparable new products.

Coal—Amend. 2, Rev. 1, GOR 12 removes control from coal, other solid fuels and related commodities and services at all levels of distribution.

Industrial Materials—Amend. 41, GOR 9 decontrols a wide range of industrial materials and manufactured goods. Included are: Nonmetallic building materials, refractory products, farm machinery and equipment, certain automotive equipment, machinery items and certain components and parts. Except for a requirement that records be preserved, this order has the effect of revoking CPR 125, covering refractory products, and exempting the listed products from provisions of GCPR, CPR 22, CPR 30 and other regulations.

Rails—Amend. 1, CPR 186 postpones indefinitely the effective date of CPR 186 which covers sales of relaying rail and used track accessories. CPR 186 was originally issued to give warehouse resellers sufficient time to make required computations.

Construction

Steel Inquiries and Awards

Fabricated steel inquiries this week include the following:

343 **Tons,** Merrimack, Mass., 3-span continuous steel girder bridge on Daniel Webster Highway (Rt. 3) over Soughegan River. Completion date Jan. 1, 1954.

Reinforcing bar inquiries this week include the following:

550 **Tons,** Tiverton and Portsmouth, R. I., new Sakonnet River bridge.

Piling steel inquiries this week include the following:

1950 **Tons,** Tiverton and Portsmouth, R. I., substructure for new Sakonnet River bridge.

January Building Starts High

Construction activity for 1953 got off to a good start in January. U. S. Bureau of Labor Statistics reports an estimated $2.3 billion worth of new starts during the month.

Better than normal weather in some regions held the usual seasonal decline from December to 6 pct.

Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Compressors, air, 24, $95,566, Schramm Inc., West Chester, Pa.

Screws, machine, wood and tapping, $53,136, Continental Screw Co., New Bedford, Mass.

Floodlights, 35, $104,895, Steward Stamping Prod., Brooklyn.

Warehouse, sectional, 44, $82,012, Hussmann Refrigerator, St. Louis.

Switches, L. Sensitive, 5000 ea, $52,8[illegible] Betts & Betts Corp., New York.

Bomb, GP, job, $2,734,352, Temco, Inc., Nashville, Tenn.

Fin assy, 114000, $2,954,482, A. O. Smith Corp., Milwaukee.

Primer, percussion, M60, 900000, $220,265, Langson Mfg. Co., Chicago.

Fuze, PD, 1000000, $2,070,000, Badger Meter Mfg. Co., Milwaukee.

Booster, M21A4, steel, 413000, $414,[illegible] Northwest Auto Prod., Minneapolis.

Case cartridge, 500000, $2,432,74[illegible] Rheem Mfg. Co., Chicago, *W. H. Roy.*

Fuze, PD, 1000000, $2,070,000, National Pressure Cooker, Eau Claire, Wis.

Primer, percussion, 923000, $241,12[illegible] Langson Mfg. Co., Chicago.

Primer, percussion, 1375000, $514,[illegible] North Star Specialties, Minneapolis.

Lathe, powder chamber boring, 2, $101,130, Lehman Mach. Co., St. Louis.

Parts for 57 MM rifle, 7046, $58,84[illegible] Firestone Tire & Rubber Co., Akron, *C. D. Smith.*

Spare parts, var, $212,913, North American Aviation, Inc., Port Columbus, Ohio.

Spare parts, var, $168,425, North American Aviation, Inc., Port Columbus, Ohio.

Rack, arm, M2 for Browning auto rifle, 1300 ea, $52,090, Ever-Tite Mfg. Co., Davenport, Ia.

Box, gyrp control gear, 275 ea, $52,566, Universal Stamping & Machine Co., Plymouth, Mich.

Base, ring for 4.2" mortar, 420 ea, $140,112, Triple "E" Mfg. Co., Marion, Ia.

Base plate assy, 420 ea, Triple "E" Mfg. Co., Marion, Ia.

Mechanism, elevating and traversing assy, 7000 ea, $190,500, Acme Coppersmithing & Machine Co., Orland, Pa.

Fuze, PD, m48A3, 270000, $511,920, Dole Valve Co., Chicago.

Liner, deep cavity shell, 4958000, $237,984, Junior Toy Corp., Hammond, Ind.

Shell, chemical, 60, 105 MM, 129200, $991,700, George D. Roper, Rockford, Ill.

Tank-automotive spare parts, $913,106, International Harvester, Chicago.

Fuze, bomb nose, 40000, $319,200, General Time Corp., LaSalle, Ill., *W. B. Sampson.*

Shell, 90 MM, HE, M71, 275000, $1,867,250, Burlington Brass Works, Burlington, Ill.

Fans, electric, 5475 ea, $161,345, Emerson Elec. Mfg., St. Louis.

Airplane elevator mach., 11 lot, $1,839,500, Otis Elevator Co., New York.

Replenishment of motor vehicle parts, 18000, $267,460, The Grote Mfg. Co., Inc., Bellevue, Ky.

Replenishment of motor vehicle parts, 40000, $135,864, Eaton Mfg. Co., Detroit.

Replenishment of motor vehicle parts, 55000, $281,600, Triplex Corp., of America, Pueblo, Colo.

Replenishment of tanks and combat vehicle parts, 2000, $58,556, Marine Iron Works, Inc., Tacoma, Wash.

Replenishment of tanks and combat vehicle parts, 4600, $227,480, F. J. McCarthy Co., Cadillac, Mich.

Table, bedside, cabinet type, metal, 12200, $234,606, Joseph Turk Mfg. Co., Bradley, Ill.

Lathe, toolmakers, 15 ea, $183,060, Gorton-Howell Mach., Tulsa, Okla.

Machine-honing, 4 ea, $76,520, Micromatic Hone Corp., Detroit.

280 MM gun carriage, 14, $63,540, Treadwell Const. Co., Midland, Pa.

Shell, 4.2" mortar, 3120, $3,091,920, Scaife Co., Oakmont, Pa.

Body & extension, 130000 ea, $121,290, Dinges Corp., Hanover, Pa.

Fuze, 640000, $5,638,400, Eastman Kodak Co., Rochester, N. Y.

Fuze, PD, M52A2, 11290, $8,185,450, Precision Casting Co., Syracuse, N. Y.

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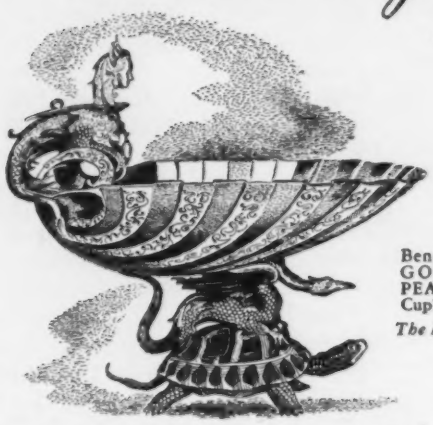

Benvenuto Cellini. CUP OF GOLD, ENAMEL, and PEARLS (The "Rospigliosi Cup"). Italian 16th century.
The Metropolitan Museum of Art

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Industrial Briefs

Wide Open Spaces . . . ATLAS POWDER CO., Wilmington, Del., has bought a tract of land on U. S. Route 202 for the construction of a new office.

Defense "E" . . . Individual plants, research and technical laboratories, and service-supplying firms are eligible to get the DEFENSE DEPT. "E" AWARD, criteria for which have just been announced.

Dallas Rep . . . LUKENS STEEL CO., reports that Maintenance Engineering Corp. will be its sales representative in northern Texas. Office is at 1330 N. Industrial Blvd.

Expanding . . . AMERICAN BRAKE SHOE CO., New York, is expanding its facilities for the manufacture of powder metallurgy products. The company entered the field after 4 years of laboratory research as part of its diversification program.

New Name . . . HEINRICH TOOLS INC., Racine, Wis., is the new name of the National Machine Tool Co.

Research Lab . . . ALLIED CHEMICAL & DYE CORP.'s, General Chemical Div. plans to build a large research laboratory at Morristown, N. J. It will be located on the outskirts of Morristown on Columbia Rd., adjacent to the company's Central Research Laboratory.

Announcement . . . ROMULUS TOOL & ENGINEERING, Romulus, Mich., is a newly formed company owned and operated by Joseph Player and Edward Halik.

Milestone . . . WESTINGHOUSE ELECTRIC CORP.'s Motor & Control Div., Buffalo, turned out its one-millionth motor since opening the plant in 1946.

Gets Contract . . . RUDISILL FOUNDRY CO., Anniston, Ala., has been awarded a $6,688,000 shell contract by the U. S. Army as a prime contractor.

Coming Up . . . UNIVERSITY OF WISCONSIN will hold a 2-day institute on foundry safety and health protection for the nation's foundry industry on Mar. 24-25, in its Memorial Union Bldg.

To Build . . . HYDROPRESS, INC., New York, is designing and building a new type rolling mill for the fabrication of tapered aluminum alloy plates and sheets. Items are required for the latest model military and naval aircraft.

Working Fast . . . STANDARD PRESSED STEEL CO., Jenkintown, Pa., is rapidly pushing to conclusion a $10-million machinery and new-plant expansion program. When finished in mid-1953, the company will have more than 650,000 sq ft of integrated floor space under one roof.

Open For Business . . . WICKMAN MFG. CO. has completed construction of its new factory at 10325 Capital Ave., Detroit.

Southern Distributor . . . KURT ORBAN CO., INC., New York, has appointed G. D. Machine Tool Co., Tucker, Ga., distributor of the company's line of German-made machine tools in Georgia, Tennessee, North Carolina, South Carolina, Florida, and Virginia.

Montreal Extension . . . THE FOXBORO CO., Foxboro, Mass., reports that a new plant extension by The Foxboro Co., Ltd., at Montreal has more than doubled its instrument manufacturing facilities in Canada.

Dig In . . . KAISER ALUMINUM & CHEMICAL CORP., formally opened its $12 million bauxite mining operations on the British West Indies Island of Jamaica early this month. Operated by Kaiser Bauxite Co., a subsidiary, the new bauxite properties will have an annual capacity of approximately 2 million tons.

Total Payroll . . . REPUBLIC STEEL CORP.'s 1952 payroll totalled $290,439,000 for 69,400 employees, a decline of $8,212,000 from 1951 because of the 2-month steel strike last summer.

Appointed . . . THE JOHN HEWSON CO., New York, has appointed A. G. Moore its representative for the New Jersey marketing area.

Dividend . . . THE M. A. HANNA CO., Cleveland, has declared a dividend of 50c a share on common stock.

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Complete Steel Service* from One Source

This completely modern plant with latest type equipment for *rolling* strip and processing sheet and strip steel is your ideal source for:

- *Warehouse stocks in sheets, plates, coils, cut lengths . . . All tempers and finishes.
- *Steel strip in coils and cut lengths . . . restricted tolerances, all tempers and finishes.
- *Roller leveling, pickling, annealing, shearing, slitting and skin rolling.

PRODUCTION STEEL STRIP CORPORATION supplements our regular warehouse service with custom steel at mill prices. This new, 4-high, reversing type cold strip mill with its modern, electronically operated *fingertip* quality control affords unusual flexibility in supplying steel strip to your exact specifications. Thickness .025 to .125 in all tempers and either bright or satin finish, can be processed to your exact width in coil or cut lengths.

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Phone: TWinbrook 3-5000

PRODUCTION STEEL STRIP CORP.
20001 Sherwood Ave., Detroit 34, Mich.
Phone: TWinbrook 3-5000

PRODUCTION STEEL COIL, INC.
20001 Sherwood Ave., Detroit 34, Mich.
Phone: TWinbrook 3-5000

PRODUCTION STEEL CO. OF ILLINOIS
2801 Roosevelt Rd., Broadview, Ill. (Chicago)
Phone: MAnsfield 6-4242

SENECA STEEL SERVICE, INC.
1050 Military Rd., Buffalo 17, N. Y.
Phone: Riverside 7920

SALES OFFICES:

PRODUCTION STEEL COMPANY
1002 E. 81st Street, Indianapolis, Ind.
Phone: Broadway 3468
E. W. Richardson, Sales Representative

PRODUCTION STEEL COMPANY
548 W. Mechanic Street, Jackson, Mich.
Phone: 2-9097
Glenn Christman, Sales Representative

PRODUCTION STEEL CO. OF ILLINOIS
7521 West Dixon St., Milwaukee, Wisc.
Phone: BLuemound 8-8323
Warren P. Bidwell, Sales Representative

SENECA STEEL SERVICE, INC.
739 Westchester Ave., Rochester, N. Y.
Phone: Culver 7480
W. J. Knoll, Sales Representative

SENECA STEEL SERVICE, INC.
1347 Northcliffe Rd., Syracuse, N. Y.
Phone: 73-5722
Dean Hethington, Sales Representative

SENECA STEEL SERVICE, INC.
347 Price Street, Jamestown, N. Y.
Phone: 5759
S. N. Olmsted, Jr., Sales Representative

PRODUCTION STEEL COMPANY
1040 High View Lane, Green Bay, Wisc.
Phone: Howard 7407
Tony Canadeo, Sales Representative

Your Cab Is Probably a Plymouth

Chrysler Corp. subsidiary makes 50 pct of all U.S. cabs . . . Aggressive selling, durability, economy major reasons for leadership . . . Adds heavy duty features—By *R. D. Raddant.*

When you jump into a cab for that fast trip to the station, chances are about even that it will be a Plymouth.

This third best-selling of all automobiles has nearly cornered the cab market. Today, 50 pct of all taxi cabs of standard make come from Plymouth Div. of Chrysler Corp. A substantial proportion of each day's production has the distinguishing paint job that earmarks it for a taxi fleet.

Why It Leads . . . Leadership in this field is attributed to several points. One is the car itself. Its durability, economy and easy handling make it a likely candidate for the business.

Second, Plymouth goes after the market aggressively, providing a taxi "package" in its assembly and also providing substantial fleet discounts to cab operators.

There are many Plymouths serving as cabs that have no special equipment. But most cab companies request the "package."

Heavy Duty . . . This consists of building in several heavy duty features. These include 10-in. clutch against a standard 9½ in., a size 12 front transmission ball bearing, heavier car springs as well as heavier seat springs, and a heavy duty generator.

Larger clutch and bearings are designed to take the extra wear of more low gear driving and more shifting requirements. The springs result in a little harder ride and firmer seat cushions, but the steady load of the cab makes the heavier type desirable.

The heavy duty generator is required when extra electrical load is added by a two-way telephone or radio, for example.

Big Business . . . W. B. Price, director of service at Plymouth, points out that the average cab is traded in at 80,000 miles. Under a system of preventative maintenance, they hold up well for this distance and are in good enough condition for satisfactory resale.

And taxis are big business. One West Coast fleet numbers 250 and an eastern city has a fleet of 1900 Plymouths. Cab sales are conducted like other car sales through the dealer. Fleet sales, however, are coordinated by Fargo Motor Corp., a Chrysler division which performs this function.

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS	TOTAL
Feb. 21, 1953	132,039*	27,980*	160,029*
Feb. 14, 1953	122,781	24,321	147,102
Feb. 23, 1952	83,707	26,835	110,542
Feb. 16, 1952	83,373	28,448	111,821

*Estimated

Source: *Ward's Reports*

Human Development . . . Last week General Motors announced a major expansion in what one executive called GM's "development on the human side."

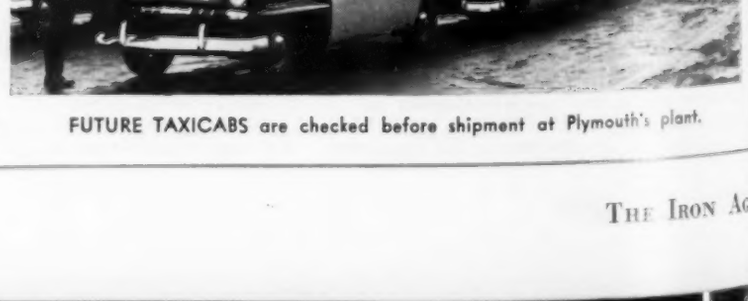
He referred to the General Motors Institute at Flint, Mich., where 3235 young engineers have been graduated since 1928 to take over industry technological jobs.

Room for More . . . Expansion will comprise a building of 83,000 sq ft. It will add approximately 40 pct to classroom, laboratory and general service area.

As a result, enrollment in the cooperative programs can be increased to 2000 in 1954. This will result in a graduating class in 1956 of about 400, compared with the present average of 293 graduates a year.

In the growing institute, GM is helping to solve the problem confronting industry everywhere—the shortage of engineers.

Long-Term Technology . . . John F. Gordon, GM vice-president and



FUTURE TAXICABS are checked before shipment at Plymouth's plant.

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airman of the Institute's board regents, said the expansion will sult in a structure "of modern ceptable standards equipped roughout with the most recent d effective type of engineering ucational facilities."

"This program represents an- her way in which General Motors ovides for the continuation of long-term program of techno- gical advancement" the G.M. ce-president added.

Helps Competitors . . . GM is a ajor employer of engineering raduates and its own Institute only one source of engineering ersonnel for the company.

The company is proud of the mber of graduates who remain, t it is a standing joke that its n development program occa- ionally results in a top executive a competitive company.

The Institute is conducted on a operative basis. Qualified high hool graduates apply for an ap- intment by one of the corpora- ion's divisions.

In-Plant Training . . . At the d of the course, the grad has ompleted all resident require- ents for his degree. He is then mployed full-time in his appoint- g plant for 2 years, working on special project.

LASTIC CAR:

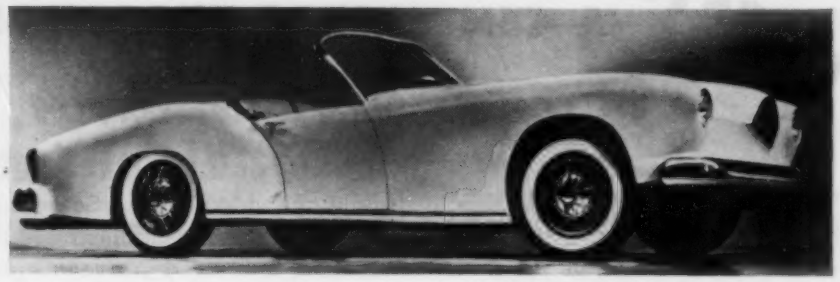
New K-F features body gimmicks, light weight, speedy getaway.

Kaiser-Frazer's ace-in-the-hole, s plastic DKF-161 sports car, has ow made its first public appear- nce complete with release of most f its design features.

It now appears that K-F's future s an auto producer may depend n the success of the low-slung iberglas car. K-F production has een very low over the past few onths, indicating it is having hard oing in the current market.

Style Gimmicks Featured

The DKF-161 has some body and tyling innovations that in their wn way may be as novel as its lastic construction.



FIBERGLAS BODY, low lines, safety features mark Kaiser-Frazier's new sportster.

Body design makes it possible for doors to slide into closed compartments in the front fenders when open. This tends to ease exit and entry in close quarters and eliminate some of the hazard of door openings.

The convertible top also has something new, a third of landau style position when partly open, in addition to the conventional open or closed status. The instrument panel has a new feature, a tachometer to indicate engine rpm.

Weighs Less

The Howard A. Darrin-styled body shell weighs only 300 lb, giving the entire car a road weight of slightly over 2000 lb. A conventional convertible weighs at least 1500 lb more.

Its light weight, coupled with a 100-plus horsepower engine, will give it rapid acceleration, the goal of every hot-rodder and sports car enthusiast today.

K-F has been experimenting intermittently with plastic for almost 10 years. A number of experimental bodies were constructed in 1945 and 1946 with the Owens-Corning Fiberglas Corp. A rear engine job was built at Willow Run in 1946. K-F has also used phenolic plastic to cut tooling time in the development of the Henry J.

THE BULL OF THE WOODS — By J. R. Williams

I GO ON THIS ONE, HUH? O.K.
WAIT JUST A MINUTE! THERE'S SOME MISTAKE-- THAT LATHE'S OUT OF ORDER!
I'LL SAY IT IS! THEY GOT ALL 'TH' WORKS OUT IN TH' REPAIR SHOP! TH' GUY'S NO MACHINIST OR HE'D SEE THAT AT A GLANCE!
MAYBE HE'S AN OLD FLOATER MACHINIST-- THEY COULD RUN A MACHINE WITH NOTHIN' IN IT! JUST LEND 'EM A RULE AN' SHOW 'EM TH' SCRAP PILE OR AN OLD BICYCLE!
2/27
J.R.WILLIAMS
THE MAGICIANS
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UPSETTING A CENTERLESS TRADITION ... and saving time!

"Thrufeed grinding is applicable to straight cylindrical work." So goes the handbook description of centerless grinding. The equipment illustrated here upsets this restriction on the centerless method; it thrufeed grinds the center section of torsion bars having upset ends. ¶ Cincinnati Application Engineers tooled up a CINCINNATI FILMATIC No. 2 Centerless Grinder with a modified long bar attachment and power advance and retraction of the regulating wheel slides. Movement of the slides is 1", pneumatically controlled. A short length next to one shoulder is infeed ground to size, the long center section is thrufeed ground to the opposite shoulder, and then the regulating wheel slides automatically retract. An end stop prevents traverse motion of the work while infeed grinding, and retractable roller brackets support the work while thrufeed grinding. ¶ Score another first in low-cost precision grinding by Cincinnati Engineers. Perhaps we can help you reduce costs with new equipment and new methods. It's a good idea to see what can be done today. When writing, include blueprint of work.

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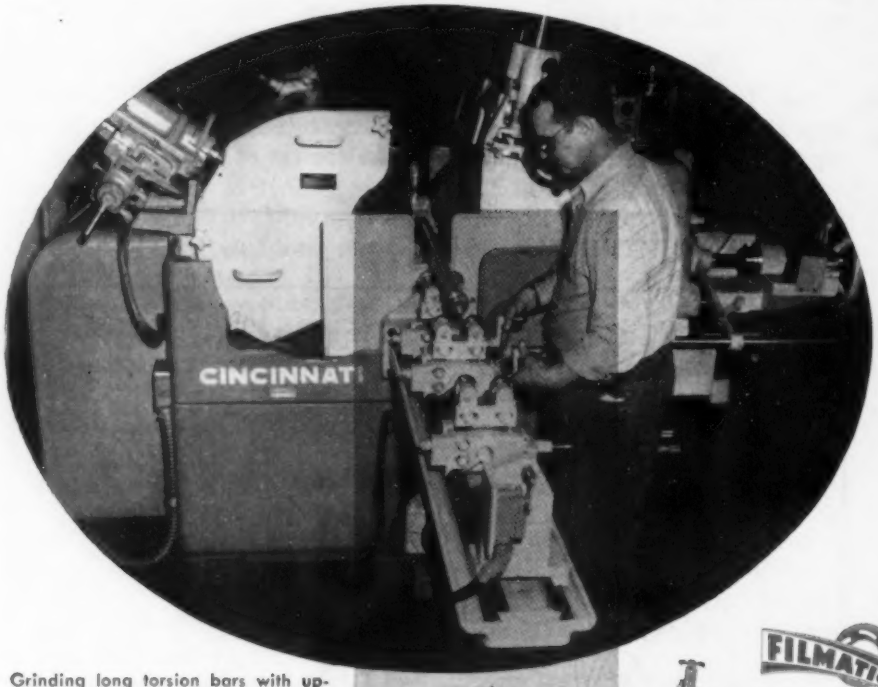
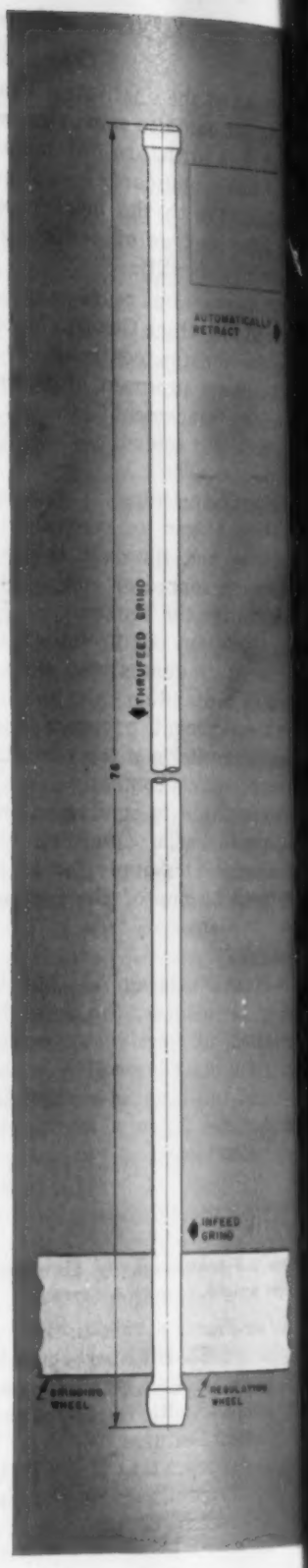


Grinding long torsion bars with upset ends by the thrufeed method on a CINCINNATI FILMATIC No. 2 Centerless Grinder.

Infeed and thrufeed methods are combined on this CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. More information about this equipment will be found in Vol. 8 No. 4 of our "Report" magazine. Complete specifications for the standard No. 2 Centerless may be obtained by writing for catalog No. G-611. Brief data in Sweet's.



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CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

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Cities Howl Over Defense Tax Losses

Mayors protest to President . . . Claim tax exempt defense facilities take big chunk out of municipal pocketbook . . . Democrats push committee to yell inflation—By G. H. Baker.

Manufacturers may be tagged with taxes on now exempt defense facilities if municipal mayors have their way. Cities are beginning to regard the defense plants within their borders as a definitely mixed blessing. Since the beginning of World War II, municipal governments have vied spiritedly to bring defense work to cities.

Bigger payrolls, new retail outlets, more individual taxpayers all resulted from the landing of a defense plant or contract for any city.

Today, city fathers feel they're not getting the full benefit of their "prizes." The reason: Loss of tax revenue from the defense works. In Detroit, industrial property with a total valuation of $16 million has been withdrawn — legally — from taxation in less than a year.

Hudson Motor Co., for example, recently told the city it was withdrawing $10 million in tools, equipment, and inventories from the tax rolls. Firm's defense contracts permit it to do so.

Ike May Help . . . Corrective action by the White House may be coming soon as a result of mayors' protests to President Eisenhower. Ike has indicated that he is sympathetic to the cities' plight, and has agreed to see what can be done.

Sherman Adams, Ike's top assistant, has agreed to sit down with the mayors and representatives of the Municipal Assn. to draw up a concrete program for action. One proposed avenue toward solution: Appoint a special commission consisting of federal, state, and local officials to work out a compromise tax agreement.

More Power for ICC? . . . Some higher rail shipping costs face steel companies and fabricating plants if a recommendation now before Congress becomes law.

Interstate Commerce Commission, hinting abuse in the current railroad practice of paying "allowances" to shippers who do their own intra-plant spotting of cars, wants Congress to ban all such allowances except those specifically authorized by the Interstate Commerce Commission.

Each individual plant's spotting allowances would then be specifically regulated by the ICC. At the Capitol, it is claimed that some of these "allowances" are tantamount to rebates, since little or no actual spotting takes place in some cases. Situation is of interest to steel and other heavy-industry plants.

Political Blackjack . . . Removal of price control is sparking new demand on Capitol Hill for creation of a congressional committee to "protect the consumer." Publicity stemming from committee hearings on too-sharp price increases may scare off "price gouging" manufacturers, is the reasoning.

Legislation along these lines is backed by a group of 23 "big city" members of the House of Representatives, only five of whom are Republicans. Proposal calls for creation of a joint Senate-House committee made up of seven senators and seven representatives that would look after the "interests of consumers" if prices go up.

Attack on Business? . . . The House group estimates that consumers might be saved "hundreds of millions of dollars" by the actions of such a committee. The danger here, though, is possibility of unjustified attacks on wholly legitimate price increases. It could also be used as a political instrument by the Democrats to take business to task for "inflation." In wrong hands this committee could be used to discredit the Administration. It's a dangerous idea.

Ease Tax Postponing . . . Simplified methods for asking postponement of federal tax-filing deadlines by corporations are now in effect. Requests for extensions no longer need be signed by a corporation official, or a person holding power of attorney, U. S. Bureau of Internal Revenue has ruled.

Applicants need only state in writing that they are "acting with the knowledge and consent of the taxpayer" when asking extensions.

Shortie Tax Form . . . In addition, the new BIR rules also permit any properly-authorized company officials or their agents to file a 1-page tax statement, instead of a tentative corporation income tax return before the Mar. 15 deadline. Such statements must be accompanied by payment of at least 40 pct of the tax estimated.

Good Scrap . . . Sales of scrap—ferrous, nonferrous, lumber, paper, rubber, textiles, cordage, and miscellaneous —brought the Navy $7,756,315 in calendar 1952.

During the year the Navy sold 205,200 tons of ferrous metal scrap.

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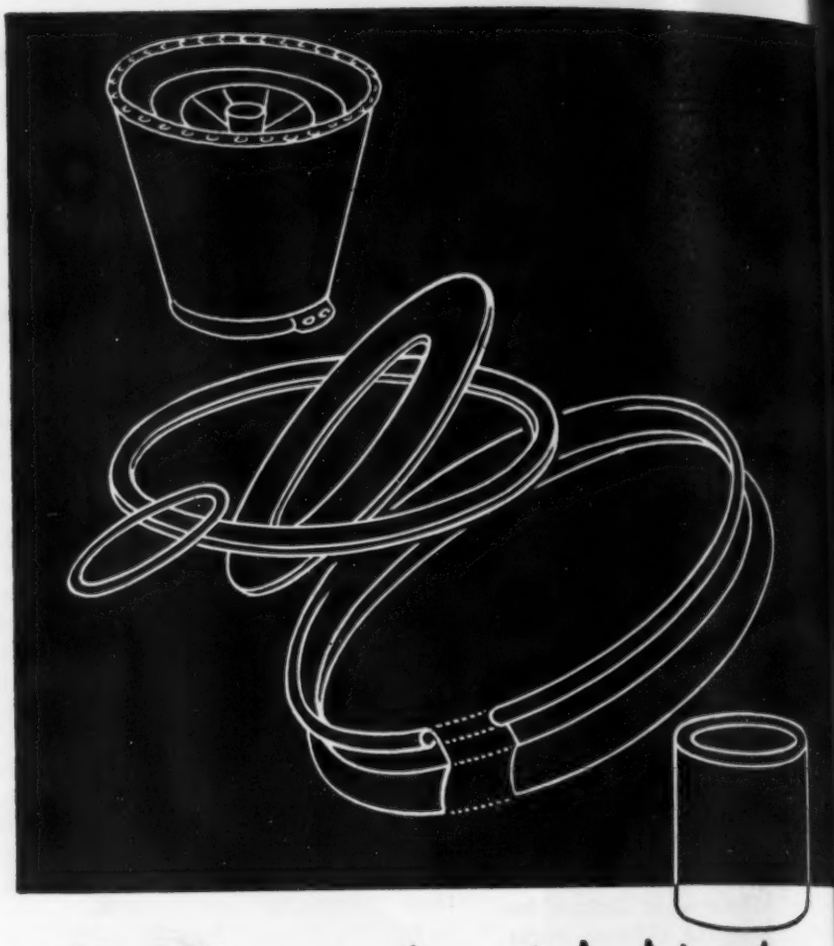
GO "AMERICAN" FOR CIRCULAR WELDED PRODUCTS



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STOCKPILES: Are We Paying Too Much?

Congress checking charges of premium prices on imported stockpile goods . . . Iron Curtain origin of some items rumored . . . Program 77 pct completed—*By A. K. Rannells.*

Senate investigators rolled up their sleeves last week and prepared to take a long, deep look at the nation's stockpiling program.

Congress wants to know if stockpiling money is being spent wisely, and if the government is paying what amount to premium prices for imported materials as some congressmen suspect.

A Hold-Up?

More than that, the legislators want to know if—as has been charged—some shipments have an origin in Iron Curtain countries and are being transshipped by devious routes to this country for sale at "hold-up" prices.

Specific allegations are that government procurement agents have contracted to pay far higher prices for foreign ores and minerals than ceiling prices in this country for items such as copper, antimony, and zinc.

Another is that shipments under a cost-plus contract with a European firm actually have their origin in Red China and are landed in the United States at double the price quoted by the firm's U. S. branch representatives.

Armed with funds to conduct a thorough probe of the matter, the Senate investigating subcommittee expects to prove or disprove the "shocking revelations" disclosed at a closed session. Names, dates, firms, places last week were still top secret.

How We Stand

Announcement that the investigation is being started came hard on the heels of submission to Congress of the Munition Board's semi-annual report on the stockpiling program.

This report says the nation has passed the halfway mark in acquiring a $7.5-billion inventory of strategic and critical materials needed as a reserve in case of all-out mobilization. Specifically, the report says that materials on hand as of Jan. 1 are valued at more than $4 billion, or roughly 53 pct.

This is somewhat more in terms of dollars than the $3.8-billion goal set in the original program established at the end of World War II. But it is actually less in terms of tonnages because of higher costs since that time.

In addition to the $4-billion worth of materials on hand, the report says an additional $1.8 billion of materials is under contract for future delivery. This brings the total, for working purposes, to $5.8 billion, or 77 pct complete.

Shortages Hurt

A somewhat better figure could have been reported, it is pointed out, except that industrial shortages made it necessary for the government to withdraw $59 million worth of copper, nickel, aluminum and cryolite for current mobilization operations.

Also, it was reported, it had been necessary to divert, or hold up delivery, of another $186 million worth which had been intended for the stockpile.

Foregoing are total figures through Dec. 31, 1952. Actually, only $3 million worth was withdrawn and $22 million diverted during the last half of 1952.

"As if we didn't know he's boss."

Goals Gained

At the present time, stockpiling goals have been completed for antimony, bismuth, metallurgical grade fluorspar, lump graphite, sperm oil, muscovite splitting mica, and 12 other items, including instrument jewel bearings.

Goals for 38 items are 60 pct or more complete. Some 25 others are considerably short of stockpiling goals, but the Munitions Board isn't worrying too much about these.

It is calculated that in case of emergency the foreseeable supply, together with amounts already in the stockpile—plus strict distribution control of production—could meet defense needs.

Included in this list are cadmium, copper, industrial diamonds, kyanite, lead, zinc, mercury, tin, platinum, and natural rubber.

Among the new problems facing the stockpiling program, is the question of storage. Storage facilities, especially for combustible materials, are seriously inadequate and should be remedied quickly, the report advises.

Miami to Mine Arizona Copper

Miami Copper Co. has undertaken the mining of some 115,000 tons of low-grade copper ore in the Globe-Miami District of Arizona through a new agreement with the Federal Government.

Under a contract signed last week with the Defense Materials Procurement Agency, Miami will develop an ore body extending out from present higher grade ores at a cost to the company of up to an estimated $3 million.

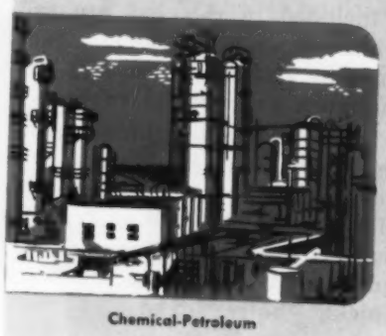
This ore is not expected to return more than 10 lb of copper per ton of ore.

Now you can make your own

High-Purity OXYGEN and NITROGEN simultaneously—with ONE Generator

Steel Scarfing

Metallurgical

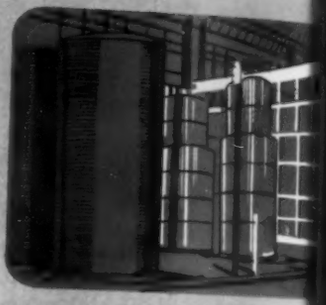


Chemical-Petroleum

OXYGEN

NITROGEN

Heat Treating



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★ Flexible—any quantity at any pressure

★ Safe, simple—easy to operate

Slash costs of inert gas—*while* you cut costs of high-purity oxygen! Make *both* in your own plant with *one* Air Products Generator. Standard *High-Purity* models are available with oxygen capacities from 2500 to 12,000 cubic feet per hour—nitrogen capacities from 4000 to 36,000 cubic feet per hour. *Liquid* oxygen and nitrogen if desired. Also *Tonnage* Generators in standard models, or of special design. Capacities *unlimited!* Write us your requirements, and send for our CATALOG.

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Hand Mill Passing Cuts Sheet Output

Dismantling of hot rolled sheet mill at U. S. Steel's Torrance scheduled . . . In operation 40 years . . . High labor costs doomed it, but demand delayed execution—*By T. M. Rohan.*

A venerable old western steelmaker will be laid to rest soon at Los Angeles.

Production of hot rolled sheet on the lone 40-year-old hand mill at the Torrance, Calif., works of U. S. Steel will be slowed down gradually through the next few weeks, and the mill dismantled late next month.

Labor Killed It . . . Hot rolled sheet is traditionally a shortage item in the West, but the oldtimer fell victim to steadily increasing labor costs. Only high postwar demand kept it in use this long.

U. S. Steel orders will be filled from other plants, principally Geneva, which will be somewhat relieved by transfer of 5000 tons monthly of shell quality billets on government directive to the Torrance plant, replacing sheet production.

The Torrance hand or "pack" mill work force of about 250 will be offered transfers to Geneva or Pittsburg Works of Columbia-Geneva Div., but many will undoubtedly go to the neighboring new Harvey Machine Co. aluminum rolling mill when it starts.

Lost Tonnage . . . Dismantling of the Torrance hand mill represents a substantial loss in western production of hot rolled sheet. Between U. S. Steel and Kaiser, the West turns out only about 30 pct of its total annual consumption of 400,000 tons. Due to the deficiency the biggest supplier is Bethlehem at Sparrows Point, which supplies well over a third.

U. S. Steel shipments from the Midwest are also heavy and the remainder is made up among several other eastern firms and about 10,000 annual tons European imports.

Biggest Yet . . . The Western Metals Show at Los Angeles, started only 8 years ago as a counterpart to the eastern affair, gets bigger every year.

Displays by over 300 firms this year will overflow Los Angeles' Pan-Pacific Auditorium, so two pavilions are going up alongside. Expected attendance Mar. 23-27 is 30,000 metal engineers, plant department heads and executives.

Thirty-seven metals papers, including ones on titanium and zirconium, are scheduled plus others in welding, non-destructive testing, foundry work and airplane and auto alloy seminars.

"We'll Do It Ourselves" . . . The vagaries of Northwest power were glaringly dragged in the open last week. General Petroleum Corp. has been unable to get assurances of uninterrupted power supply for its new $35 million refinery at Ferndale, Wash. So, it will put up its own power plant at a cost of $4 million.

Seattle District Manager J. A. Simpson said the firm would rather not put out the money for a power plant, but could not risk power interruption at the new refinery. Bechtel Corp., San Francisco engineering and construction firm, will start work on the 35,000-bbl-per-day refinery 100 miles north of Seattle about Mar. 1.

Crude will come from the Alberta-Vancouver pipeline (THE IRON AGE, Sept. 18, 1952, p. 98).

"We've hired a lot of women recently."

Seattle Billets . . . The auto industry steel shortage has furnished a new market for Seidelhuber Steel at Seattle, currently turning out 4 x 4 in. round cornered billets. West Coast forging plants are taking 6 x 6 billets.

Seidelhuber expects to get its used 10-in. mill—purchased in New Jersey last year—up in 6 weeks. Plans for a previously bought 24-in. mill are still indefinite and the company is in no hurry to put it up.

Freshman Planemakers . . . Early last year, crowded Douglas Aircraft at El Segundo decided to farm out its Navy AD-5 piston engine fighter plane program. Contracts were let to 11 firms, including a Coca-Cola vending machine maker and an airline with only a piece of property and money for necessary assembly jigs.

Last fall, center wing schedules started coming from Western Sky.

No Nails . . . Colorado Fuel & Iron Works at Pueblo, one of the area's leading nail producers, is building a 66,000-gal cooling tower of California Redwood — and is using no nails, screws, or mechanical connectors of any kind. Reason: avoid metal corroison and consequent wood deterioration.

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SUNICUT 11-S for medium duty on automatic screw machines

SUNICUT 209-S for heavy duty on automatic screw machines

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SUNICUT 110-S for heavy duty service in broaching, threading, gear cutting, heading and similar applications

All four oils keep parts and tools cooler, help maintain closer work tolerances, permit longer runs between tool dressings. All are odorless and light in color. In addition, Sunicut 11-S and 209-S have high lubricating value and are nonstaining.

For your copies of the technical bulletins describing these new oils, call the nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-2

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Civilian Orders Beef Up Tool Business

January orders show increase despite continuing drop in military needs . . . Critical list may be dropped Mar. 1 . . . Order backlogs now less than 10 months—By *E. C. Beaudet.*

Brightened market prospects for machine tool builders are reflected in January sales figures of a number of companies. Indications are that total sales in January were higher than in December. This is important because the December new order rate marked the first upward turn since July, 1952. It appears this trend is continuing.

One of the most heartening factors is the increasing proportion of civilian orders being received from diversified industries. The continuing drop in military orders did not offset this gain.

Show Largest Gain . . . Companies showing the greatest new order increases were those not heavily engaged in defense work and those with fewer machines on the critical list.

Some quarters expect the critical list to be abolished by Mar. 1. This would mean even more tools for the civilian market.

Considerable pressure is expected to be brought upon sales organizations as a result. Customers formerly unable to get needed equipment will all be clamoring for their share.

Drop Critical List . . . Although it will involve some headaches, the machine tool builders making critical list equipment will be happy to see the restriction junked. It will enable them to serve customers they formerly turned away, and some feel it will result in a better dispersal of equipment.

These machine tool men claim that in the past they shipped machine tools which they felt were not needed at the time for production, while civilian customers were in desperate need of them.

Strongest Demand . . . Greatest demand from civilian users will come from the high production industries. Some of these firms have re-scheduled their production schedules to produce more automatic equipment rather than semi-automatic machines needed by defense industries.

Due to the wide number of businesses not engaged in high production output it is difficult to point out those which will come into the market heavily. However, the fact machine tool builders will be in a better position to promise delivery should encourage orders.

GIANT horizontal boring and milling machine was built by Mesta to machine one of the Air Force's huge 50,000-ton presses.

But Backlogs Dip . . . Although the sales picture seems to be improving, the continuing high rate of shipments is steadily eating away backlogs which now stand a little under 10 months. As a result, many builders are drawing their horns in on subcontracting.

Some have already cut down the number of parts and components they are having made on the outside. A few subcontractors holding contracts for the building of complete machines are expected to be dropped after mid-year.

Would Stop Decline . . . Only factor working against a continuing decline of subcontracting would be an increase in defense orders. This would cause some firms to reverse their decision on letting subcontractors go. If recommendations of the Vance Committee report are adopted, some believe there will be a considerable number of machine tool orders from the middle of the year on.

Others are not so sure. They say the Armed Services will have to decide on the type and quantity of end items they need before orders are placed for machine tools to build up the productive capacity. This will take a long time.

One quarter believed to be increasing machine tool demands is Ordnance. More orders are expected to be placed for 105 and 155 mm shell production. For ammunition of lower calibre the productive facilities have already been pretty well filled.

No Reports . . . Eliminating the need for monthly reporting of order boards to Washington, except for machine tools on the critical list, which will be reported quarterly, is not of too much significance. It only indicates further relaxation of industry restrictions.

Some feel their helpfulness was questionable in that by the time the reports were scrutinized in Washington, they no longer reflected a true picture of orders.

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23
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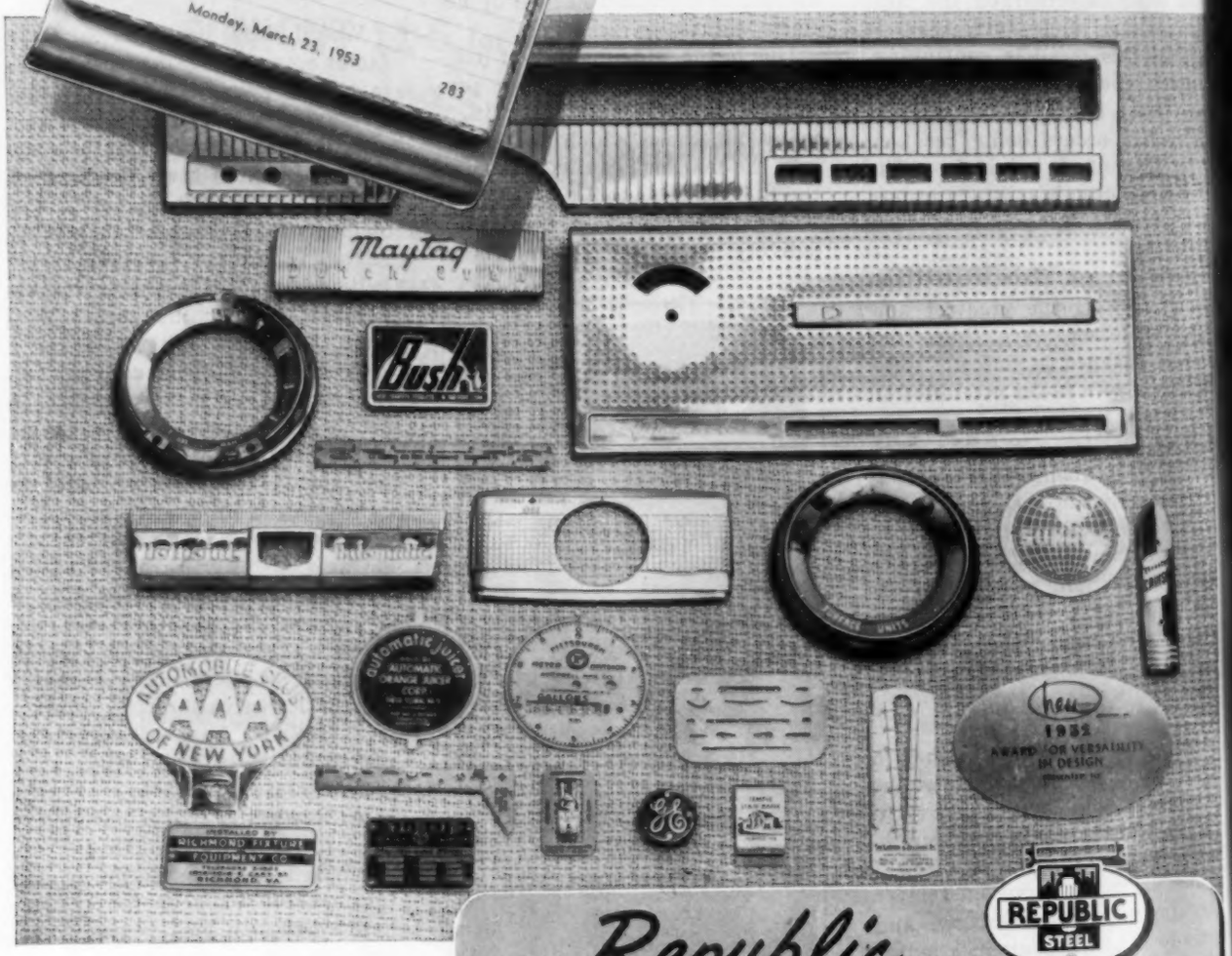

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Contact KAYDON of Muskegon

FOR ALL TYPES OF BALL AND ROLLER BEARINGS: 4" BORE TO 120" OUTSIDE DIAMETER

Photo by courtesy of Chrysler Delaware Tank Plant

So big! This super-precision turret bearing is so big that these four beauties stood comfortably inside only a portion of the 7-foot diameter to have their picture taken. • KAYDON also created the initial pilot-bearings (28.333" I.D. x 33.375" O.D. x 2.875" section) for cupolas of Patton T-48's. • *Both sizes of bearings were uniquely engineered with internal gears cut integral with the inner race.*

• • •

In many types of heavy-duty industrial machinery and war equipment, unusual KAYDON Bearings have been designed to make tough jobs easier, with dependable, controlled precision.

Dependable KAYDON BEARINGS in world's greatest tank!

Some details of performance of the new Patton T-48 tank may remain closely guarded secrets, but now it can be told that KAYDON created the initial pilot-bearings for its gunmounts and cupola.

More than merely a masterpiece in tank engineering, the Patton 48 is also an outstanding economic achievement... Army's most economically produced tank... resulting from fine teamwork of industry and labor.

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The Patton 48... speedy, most mobile of all tanks... is a symbol of insurance for peace through strength! Manufacturers contributing to this achievement take pride in confidence that America's industrial brains and skill, mobilized in a democracy, can meet any challenge! The Patton 48's are here... and they came fast!

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Not one, but *two* new features make these sturdy safety spectacles an exceptional value. Their distinctive bronze color gives them a pleasing appearance. And the new non-flammable frame is toughest plastic made for spectacles—won't chip, crack or craze—and has greatest shock resistance.

Willson Bronze styles feature the "keyhole" bridge and popular Hi-Line® temple. Brand-new wire core spatula temples add an extra comfort feature you'll welcome. They're easy to adjust for a perfect fit!

These attractive spectacles are available with Super-Tough® heat treated glass lenses or Willson Plas-Tough® plastic lenses. A full range of eye and bridge sizes make these spectacles ideal for use with prescription lenses. See your nearest Willson distributor for these new Willson Bronze styles—or write for descriptive bulletin.

For those who prefer flesh-colored plastic spectacles, with the same safety and comfort features and choice of temples, see Style WK and Style WKS.

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Continued

Gear drives

Airborne Anglgear units are standardized right-angle bevel gear drives suitable for use in either manual or power operated systems. In addition to the descriptions and specifications on these units contained in a new folder there are also drawings which show how the universal mounting feature of the Anglgears solves varied design problems. *Airborne Accessories Corp.*

For free copy circle No. 14 on postcard, p. 9

Protective coatings

Prufcoat Laboratories' technical bulletin No. 23 covers the company's new Prufcoat Sealer P-25 which is said to make possible safe application of vinyl and other heavy-duty protective coatings. The new sealer forms an effective barrier film over all surfaces which might otherwise be lifted or wrinkled by synthetic resin coatings. *Prufcoat Laboratories, Inc.*

For free copy circle No. 15 on postcard, p. 9

Spintesting

Warren Bros. vacuum high speed testing unit for spintesting rotating parts is detailed in a new bulletin. Spintesting is used in the aviation industry to check the mechanical perfection and vibration characteristics of certain parts by spinning them at higher speeds than would be encountered during normal operations. Among the types of units tested in this manner are: Fan impellors, turbine rotors, compressor rotors, accessory turbines and gyros. *Warren Bros. Mfg. Div., Warren Bros. Roads Co.*

For free copy circle No. 16 on postcard, p. 9

Temperature control

Swartout Type T2T Temperature Primary Element Transmitter, covered in a new technical bulletin, is a resistance thermometer temperature element designed to operate with the Swartout Autronic controlling and recording system. It consists of a resistance thermometer element, a thermometer adapter head, and a range card. *Swartout Co.*

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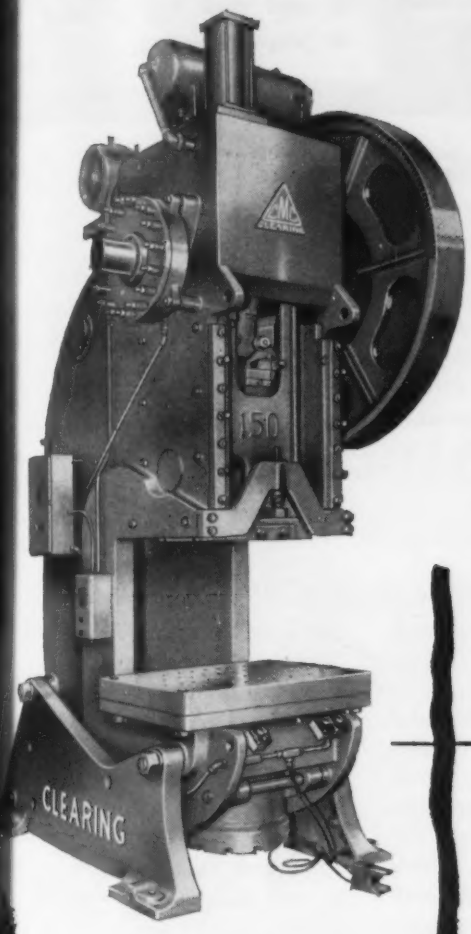
An Electrocardiogram for an O.B.I.?



What if doctors could re-design the human body? Maybe the first thing they'd do is strengthen the heart—fix it so it wouldn't give out before its time. A tough job for the doctors, but with presses it's a different matter. Because for years that's essentially the kind of treatment open back inclinable presses have had from Clearing engineers.

That's why the frames are all steel weldments, with more rugged bearings, pitman connections and adjustments. Clearing designers have analyzed functional disorders and engineered preventive maintenance into the press. So if you're looking for presses that stay young and trouble-free longer, find out about Clearing inclinables.

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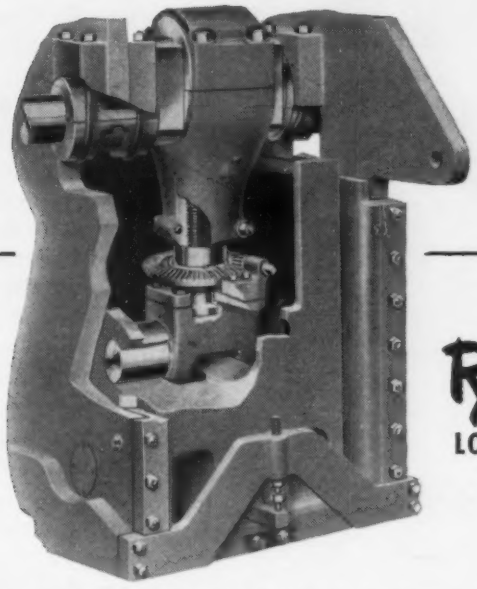

Illustrations on this page are of the Clearing 150 ton inclinable press.

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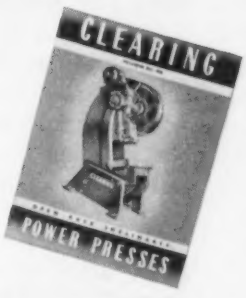

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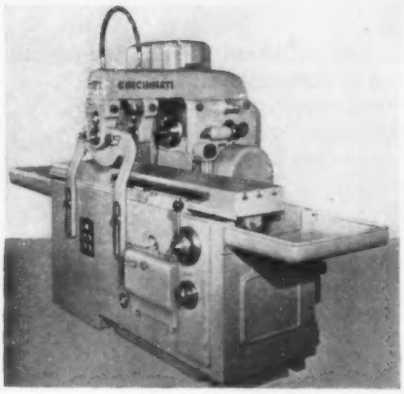
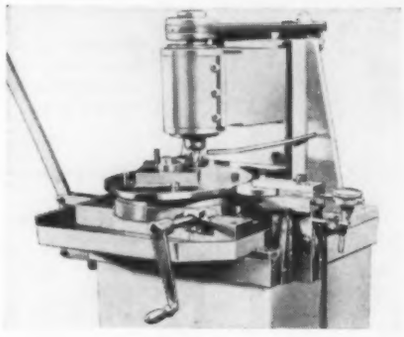


Low cost milling offered in new automatics

A new line of automatic milling machines have advanced production features plus several unique features for convenience and simplification of setup. They are built in plain, duplex, and plain rise-and-fall styles; powered at the spindle by 3 and 5 hp motors. Standard table travel is 24 in. although longer table travel, up to 144 in., may be obtained for long, comparatively light work. Automaticity and manual maneuverability have been co bined to a high degree. Throug cycle selector unit, a single le initiates the complete milling op ation, including automatic ta cycle, spindle stop, backlash eli nator, spindle carrier cycle of R machines and automatic spindle traction. Manual control is a provided for. *Cincinnati Mill Machine Co.*

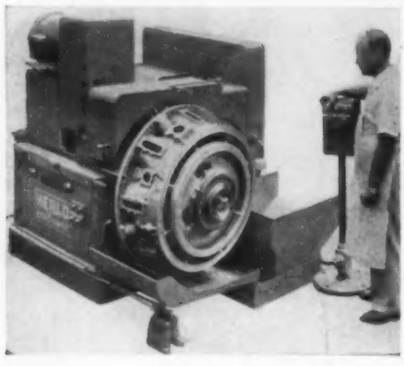
For more data circle No. 18 on postcard, p.



New machine for precision milling of profiles

New profile mill for precision milling of profiles, irregular shapes, hexagons and geometric forms is claimed to hold dimensional relations to a single dimension tolerance. Spike profile mills in operation reportedly reduce 11 operations (conventional milling) to two operations (rough and finish). Cams and fixtures used on the profile mill are built to customer specificatio The cam, precision machined, made to a maximum capacity the machine, establishing a ra relation to the machined part. duces tolerances by the same ra of cam to part. Setup for many a various jobs can be made by cha ing cams. *Spike Mfg. Co.*

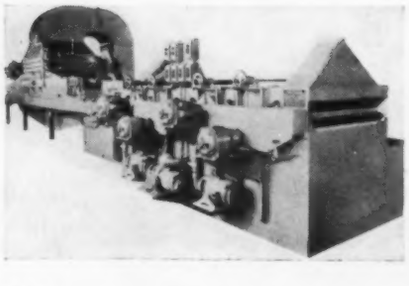
For more data circle No. 19 on postcard, p.



Special way-type unit borizes jet part

This special way-type Bore-Matic performs 40 individual borizing operations on each jet part, with a 12-min per part total cycle time, including loading and unloading. The low mounting position of the vertical indexing 8-station fixture on the way unit facilitates handling of a heavy awkward part. Indexing is hand operated with location controlled by an air-operated locator pin actuated by a foot val Tooling mounted on a No. 218 b inghead includes cross feed u which operates with tools formi and blending two radii and gen ating a face. In-stroke operatio consist of turning and plunging chamfer. Cycle is completely aut matic after table-in button is pressed. *Heald Machine Co.*

For more data circle No. 20 on postcard, p.



Machine applies lubricants to sheets and blanks

Materials can be processed at 55 fpm in the new Drawcote applicating machine, which combines with the advantages of Drawcote, a dry lubricant, to reduce stock preparation costs and speed production in metal forming operations. Three separate operations are performed in the machine: washing, coatin drying. The dry coated material clean and easy to handle; can stored for long periods and th formed with no need of addition lubricant. *Gilron Products Co.*

For more data circle No. 21 on postcard, p.

Turn Page

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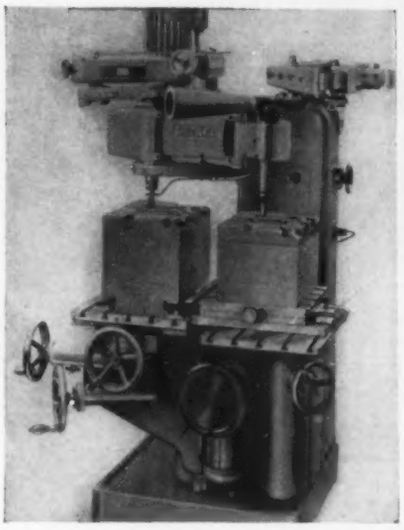
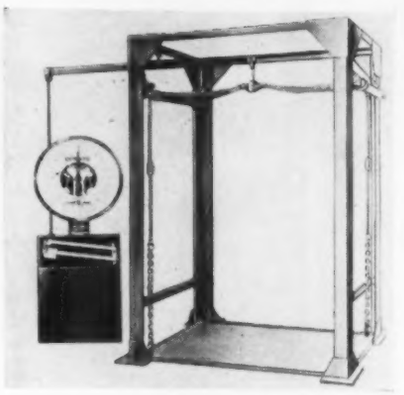


Pantograph machine reproduces dies and molds

New Deckel universal pantograph die sinking machine performs a wide range of copy milling operations from die sinking of large and intricately shaped dies and molds to light engraving. Dies and molds are accurately reproduced with high surface finish at economical production rates. The pantograph system permits two or three-dimensional milling at 1:1 ratio and reductions or enlargements from 1:1.5 to 1:4. Improvements to these larger machines include increased cutting area and working capacity. In a single setup, the cutting tool will cover an area 15 x 15¾ or 10 x 19¾ in. Power operated vertical saddle permits mast and workpiece to be raised or lo ered simultaneously at a 30 f rate. Rough milling spindle h built-in speed reducer and will h collets for chucking tools with N 2 Morse taper or straight shan up to ¾ in. diam. Infinitely var ble spindle speeds range from 60 10,000 rpm. New attachment allo circular forming operations in ho zontal and vertical planes and inclined surfaces. *Cosa Corp.*

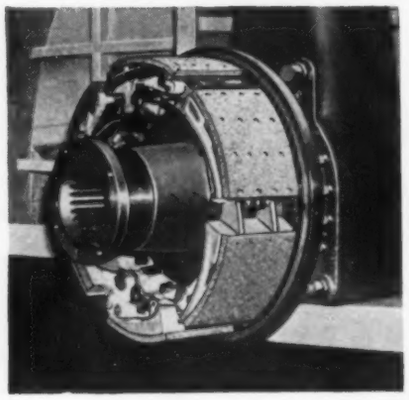
For more data circle No. 22 on postcard, p.



Overhead platform scales for heavy-duty weighin

Where pits cannot be provided for lever systems of dormant platform scales, Detecto overhead suspension platform scales meet heavy-duty weighing needs. The scale can be furnished with or without the angle support stand. The dial head is Detecto's standard assembly; a moistureproof, completely sealed swivel head. Dial mechanism parts are mounted on fixed centers, and consequently cannot be thrown o of alignment by shock loading, when the scale is moved. Tare a capacity beams are made of stai less steel, and poises are ste chrome plated. The scale is avai able with Type AC dial attachmen 100 to 4500 lb, or unit weight cab net attachment, 1125 to 6500 l *Detecto Scales, Inc.*

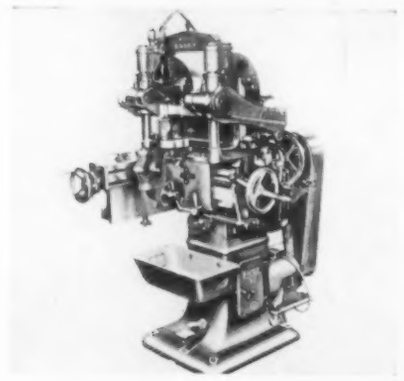
For more data circle No. 23 on postcard, p.



Vehicle brake combines service and safety

A new brake features air operation as a service brake with an auxiliary or emergency hydraulic system available in case of failure of the air system. The Hydro-air brake introduces complete service and emergency systems for braking all wheels. The air and hydraulic systems are separate and may be applied either independently or simultaneously. Brake applications developed by Fawick run from the smallest general automotive size i a three brake shoe construction using a 9-in. drum, for hydrauli over hydraulic, to a six brake sho construction, using a 35-in. drum for a combination air and hydrauli system. Installation of brakes ca be made on most standard vehicle without modification of existin axles or drums. Entire unit is sel contained. *Fawick Corp.*

For more data circle No. 24 on postcard, p.



Blanking punches machined in one setup

The function of a new punch shaper is to machine a blanking punch, hob, or profiled part directly from the solid in a single operation, using simple tools and operated by one man. Need for special punch holders or plates is completely eliminated. In most cases, punches can be finished in half the time consumed by older methods. This machine is set up simply and a high degree of accuracy and fine surfac micro-finish can be obtained, an controlled through microscopi readings. Cutting tool is the ordi nary shaping tool; stroke is ad justable. Upon completion of th straight stroke, rocker arm of thi unusual punch shaper operates in swivel motion. *British Industries Corp.*

For more data circle No. 25 on postcard, p.

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HANDLING HELPS

by A.L.L.

o More Muscle Men . . .

used to take strong men to shuffle arehouse stock — now even the office y can do the job faster and for far s money. Just get yourself an inex-

pensive Lewis-Shepard Model "J" Fork Truck to "whizz" 2000 lb. loads from place to place . . . stack 'em high with effortless ease. Incidentally, the "J" sells for about half as much as standard trucks of equal capacity. A recent check revealed that it cost just a dime (yes, I said 10c) a day to charge the "J" battery. Interested? Its other features are just as interesting — write us and see.

Don't Sell the Hand Lift Short!

In large and small plants alike, there'll always be a place for rugged hand lift trucks. Sometimes they meet all your needs; in other cases they supplement your electric trucks. For example, a

Lewis-Shepard JackLift stationed at shipping and elevator doors is good insurance against traffic tie-ups . . . the JackLift is on the spot to clear the way when electrics are busy elsewhere. We make JackLifts in many models with 1000 to 20,000 lb. capacities — special purpose models, too. And you can't buy better ones. May we show you some? Write *Lewis-Shepard Products, Inc., 315 Walnut St., Watertown 72 Massachusetts.*

By reducing aisle widths to 58 inches between storage racks, The Foxboro Company, Foxboro, Mass., substantially increases storage space. Keeping materials handling efficiency high in these narrow aisles is a job for *one particular* truck — the new Lewis-Shepard Electric Jack-Stacker with capacities to 6000 lbs. Officials at Foxboro report that the Jack-Stacker was the only truck which could meet their specifications.

Take a long look at this new Jack-Stacker . . . it'll get into the tightest places with ease. And it has all the other features you'll want, too: speed with smooth acceleration, powerful brakes, simplicity of operation — all controls are in handle head, "squeeze to start . . . release to brake". Prove for yourself its greater dependability and economy — write for Catalogs, Comparison Chart and "Proof Folders".

HERE'S MORE PROOF OF LEWIS-SHEPARD WALKIE TRUCK DEPENDABILITY

Listed are some current L-S reorders from blue-chip companies in various industries:

Amusement Goods	had	74	reordered	6
Insulation Mfr.	had	1	reordered	15
Electrical Goods	had	194	reordered	14
Grocery Chain	had	73	reordered	6
Chemical Mfr.	had	14	reordered	5
Rubber Goods Mfr.	had	5	reordered	3
Carbon Mfr.	had	23	reordered	4

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In addition to our main plant and warehouse at Pittsburgh, Levinson has built a modern new distributing center at Galion, Ohio. The result . . . improved service and deliveries to steel buyers throughout the district.

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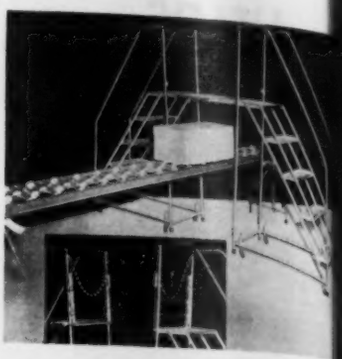
STEEL SALES COMPANY

PITTSBURGH, PA.—South 20th and Wharton Sts.

GALION, OHIO—387 South Market St.

LSS-30



Conveyer walk-over

The passage blocks and inaccessabilities of areas above conveyer systems are easily eliminated by dual safety step ladders equipped with a connecting walkway. The walkway can be folded up so that the ladders may be used for normal requirements. Standard size ladders are available for almost any required height. They are built of steel; rugged, long-lived; for permanent or semi-permanent installation. *Ballymore Co.*

For more data circle No. 26 on postcard, p. 99

Tungsten welding rod

New tungsten zirconium alloy arc welding rod saves time and expense on inert gas welding jobs. Called Zirtung, the new electrode features less contamination pick-up on touch starting, continued steady arc and longer working life. It is suited for use on all metals, particularly mold steel, aluminum and magnesium where contamination on touch starting is greatest. *Sylvania Electric Products, Inc.*

For more data circle No. 27 on postcard, p. 99

Double ended stackbins

For continuous assembly operations double-ended stackbins in stackracks serve operators on two assembly lines set up face-to-face. Materials or components are instantly available and accessible from both positions. Reloading can be done from either end or by replacing with a full double ended stackbin. Bins and racks are heavy gage steel with built-in positive stacking, index card holders on both ends. *Stackbin Corp.*

For more data circle No. 28 on postcard, p. 99

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Midget fastener

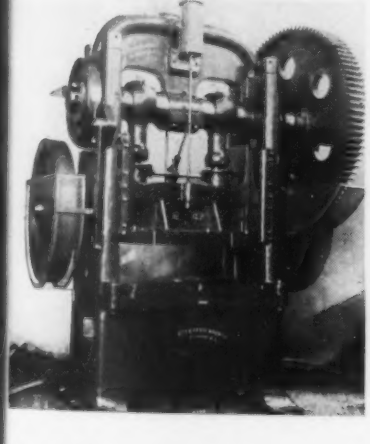
Weighing ½ oz and held in a compact ¾ in. long housing, a miniature fastener is adjustable to door frames varying from 0 to 25/32 in. thick. Installation is accomplished by slipping its knurled activating knob through a hole in the door and attaching with two rivets or spot welds. *Southco Div., South Chester Corp.*

For more data circle No. 29 on postcard, p. 99.

Reduced foam

New formulas recently perfected and field tested reduced foam formation up to 50 pct in electro cleaning solutions. They apply to Wyandotte F. S., No. 90 and B. N., which are now less dusty. The new formulated products minimize workers' complaints normally caused by coughing, sneezing and skin irritations. *Wyandotte Chemicals Corp.*

For more data circle No. 30 on postcard, p. 99.



Double crank press

New double crank press has 150 tons capacity; is back-geared and arranged for motor drive. Slide is balanced by air cylinders and ratchet mechanism is attached for adjusting slide. The distance between housing is 49 in., bed area 32 x 39 in., standard stroke 4 in., maximum 10 in., adjustment of slide 5 in. area of slide 24 x 40 in. A 15 hp motor will drive this press. Weight is 32,000 lb and shutweight can be made to suit requirements.

For more data circle No. 31 on postcard, p. 99.

Turn Page

HELD IN QUARANTINE

. . . and not released until proved fit!

That's the fate of all PERKINS precision, custom-made GEARS prior to shipment. The folks in our inspection department — a section of which is shown — may be a suspicious lot (never mind what some other people in our plant call them), but when they certify a gear to be sound and "as specified" you can bet your last bottom dollar that the end-product of which they ultimately become an integral part, will be a *better* product!

NOTE 1: A new product is the **Perkins Precision Spring Coiler.** This coiler (patent applied for) turns out precision springs – any type, shape, size, from wire sizes .005 to .125.

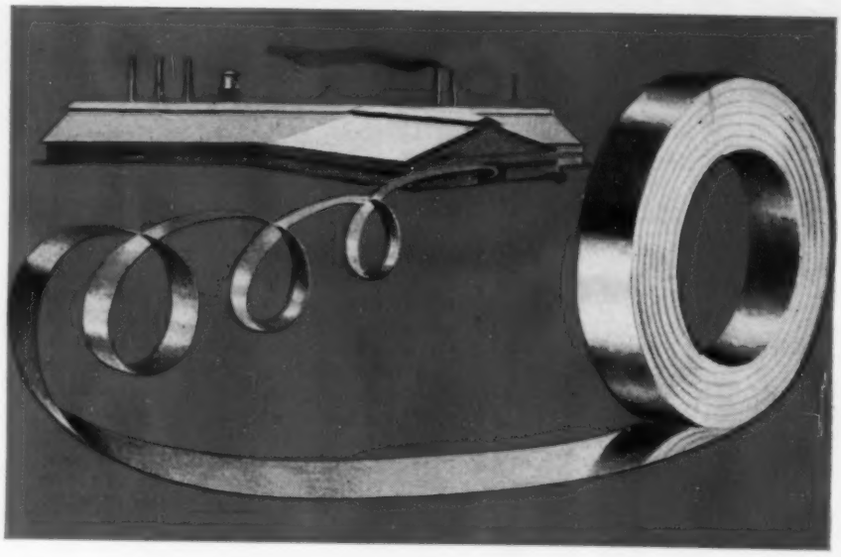
2: Another new product – the **Perkins "Bendit 15"** – a patented metal forming machine bends and shapes sheets, rods; strips tubing into innumerable complex as well as simple forms that would be difficult or impossible to make by other means. Eliminates need for expensive tools or specialized skills. Ht. 47", net wt. 200 lbs. Write today for descriptive catalogs, prices etc.

PERKINS MAKES:
Helical Gears
Bevel Gears
Sprockets
Ratchets
Worm Gears
Spiral Gears
Spur Gears with shaved or ground teeth
Ground Thread Worms

PERKINS MACHINE & GEAR COMPANY

WEST SPRINGFIELD, MASSACHUSETTS

FOLLANSBEE
COLD ROLLED STRIP
FOR
CUSTOM-QUALITY
WITH CUSTOM-SERVICE



For your strip requirements for any type of production—specialty or run-of-mill—you may use Follansbee Cold Rolled Strip with complete assurance. It is rolled, tempered and supplied to your specifications. Follansbee Cold Rolled Strip provides a continuous supply of uniform steel from coils to your automatics, regardless of forming operations involved.

Follansbee Steel Corporation is set up to supply you with quick, direct, personalized service.

Consult your trained Follansbee Steel representative. He will be glad to discuss your fabricating problems with you.

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GENERAL OFFICES, PITTSBURGH 30, PA.

POLISHED BLUE SHEETS AND COILS SEAMLESS TERNE ROLL ROOFING
COLD ROLLED STRIP

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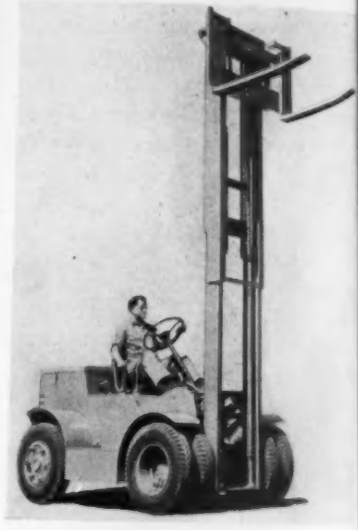
FOLLANSBEE METAL WAREHOUSES
Pittsburgh, Pa. Rochester, N.Y. Fairfield, Conn.

Plate resistors

For controllers, starters and other low-current resistor applications, new Tab-Weld-X plate resistors consist of two rows of grids, one above the other welded to a common terminal plate at one end. On the other side, the grid-ends are off-set to mate with the adjacent terminal plates. Welding provides a continuous current path. Terminal plates along both sides provide strong support for external connections. Liberal spacing between grids gives high heat radiation. They are made of corrosion-resistant chromium alloy steel. *Electric Controller & Mfg. Co.*

For more data circle No. 32 on postcard, p. 9



Gas-powered truck

A 6000-lb gas powered fork truck on pneumatic tires expedites indoor-outdoor handling operations. Open tower provides unobstructed vision for the driver because hoist cylinders and chains are located within the side members of the tower. Single lever control of hoisting and tilting speeds handling. Four speeds forward, four reverse for any operation condition. Larger wheels on rear makes steering easier. Planetary gear drive in the wheels reduces wear and tear on differential and drive axles. *Ross Carrier Co.*

For more data circle No. 33 on postcard, p. 9

UNIVERSITY OF MICHIGAN LIBRARIES

Miniature blowers

Miniature blowers for cooling industrial and airborne electronic equipment consist of a scroll which directs the flow of air produced by the enclosed blower wheel, and a suitable back plate. Four sizes have 1½, 2, 2½ and 3-in. blower wheels respectively. Scrolls are Alkyd plastic material reinforced with fiber glass; have impact strength and dimensional stability. Blowers are driven by miniature 400 cycle or variable frequency electric motors. *Electroflow Pumps Inc.*

For more data circle No. 34 on postcard, p. 99.

One-man fire engine

A new, one-man fire-fighting wheeled engine for extinguishing large-scale B and C fires has a capacity of 150 lb of dry chemical. The Model 150 weighs 480 lb, fully charged, and can be easily wheeled, maneuvered and operated by one man. Expellent is dry nitrogen, with a sustained operating pressure of 200 psi during the entire 45-sec period of discharge. Discharge range is 20 to 25 ft. *American-LaFrance Foamite Corp.*

For more data circle No. 35 on postcard, p. 99.

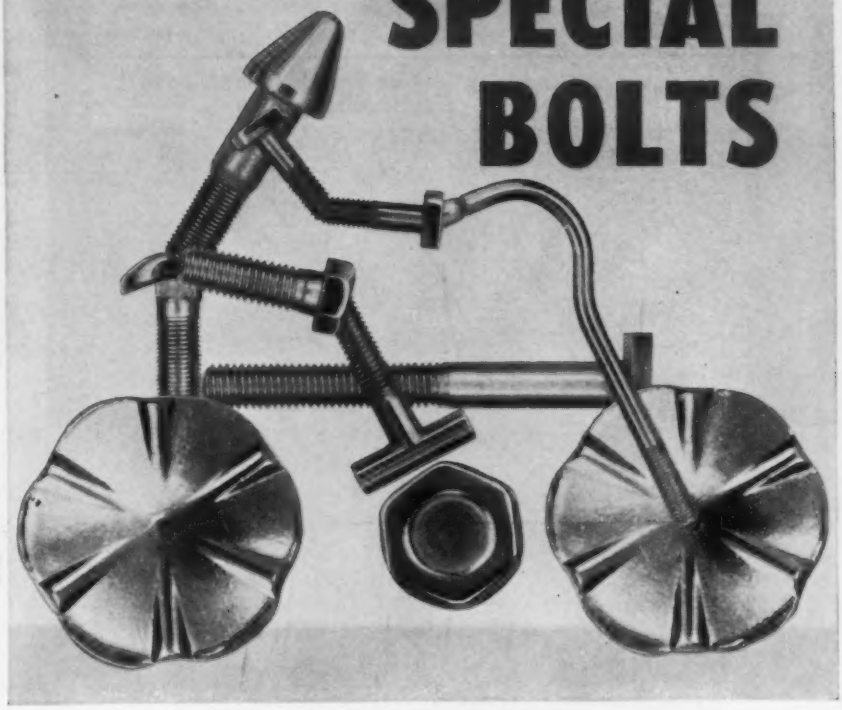
Safety goggle

New safety goggle for general use can be worn on jobs where a respirator is needed. Respirators fitting over the bridge of the nose do not interfere with these goggles, assuring proper fit and comfort. The Panoram gives the wearer a wide field of vision; is adjustable to the contour of the face; protects against injury from flying particles. *American Optical Co.*

For more data circle No. 36 on postcard, p. 99.

Turn Page

Build "Sales Features" into your Products with SPECIAL BOLTS



● Why limit the design of your products to ordinary fasteners? Special Circle Ⓑ bolts can often add sales appeal in improved design with greater strength. Equally important, you can figure on faster, easier assembly at lower unit cost. Call on our experience to gain plenty of practical advantages.

● In specifying and ordering standard fasteners, you will find our Catalog No. 51 very helpful. Write for your copy.

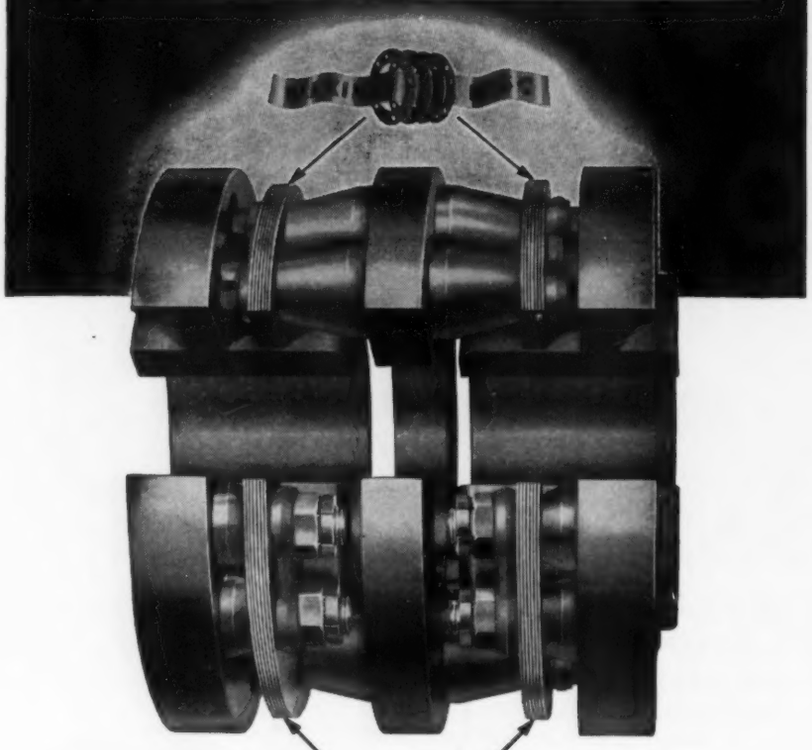
BUFFALO
BOLT COMPANY
Division of Buffalo-Eclipse Corporation
North Tonawanda, N. Y.
Sales Offices in Principal Cities

PRODUCERS OF CIRCLE Ⓑ PRODUCTS — BOLTS • NUTS • RIVETS AND SPECIAL FASTENERS

AVOID COSTLY SHUT-DOWNS!

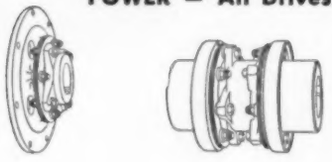
prolong the life of your machines with Thomas Couplings

DISTINCTIVE ADVANTAGES of THOMAS ALL-METAL COUPLINGS	
GREATEST ECONOMY	No Maintenance Pays for Itself
NO LUBRICATION	No Wearing Parts Human Element Eliminated
NO BACKLASH	All Parts Solidly Bolted No Loose Parts
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment

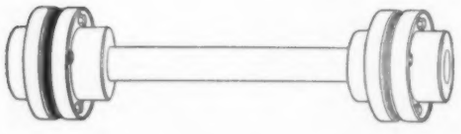


Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

SPEEDS — All Speeds up to 30,000 RPM.
POWER — All Drives up to 40,000 HP.



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.



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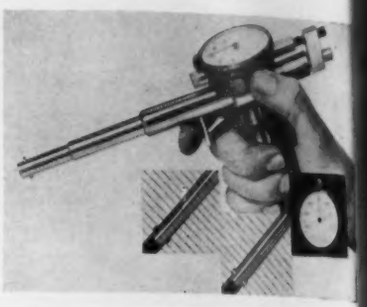

Small diameter gage

Measurement of small internal groove diameters is made quickly, accurately, and economically with Rimat's new line of P gages. The instruments are small enough to enter a 0.310 in. bore and measure groove diameters for O ring AN-6227-6 and snap ring groove NAS-50-31. Measurement of thread reliefs, by pass reliefs in hydraulic mechanisms, and small bores are among the other uses for these gages. *Rimat Tool Co.*

For more data circle No. 37 on postcard, p. 99.

Sisal buff

Finger-type design makes a new buff extremely flexible and adaptable for work involving curved surfaces and recesses. Specially processed, tightly twisted sisal twine is fabricated into each buff finger in such a manner that only the raw ends of the sisal fibers are in contact with the work; cutting compounds are readily picked up and held, and the tough part of the sisal is actually doing the cutting. *Geo. R. Churchill Co., Inc.*

For more data circle No. 38 on postcard, p. 99.

Crimping tool

Three improvements in the AMP hand hydraulic tool which crimps AMP heavy duty solderless terminals to stranded or solid wire include the tool head with spring-loaded latch for split-second opening; complete 360° axial rotation of the head for work in cramped or awkward locations; and a cradle permitting use as a bench tool. The tool develops 12 tons crimping pressure safely and easily. *Aircraft-Marine Products, Inc.*

For more data circle No. 39 on postcard, p. 99.

Turn Page

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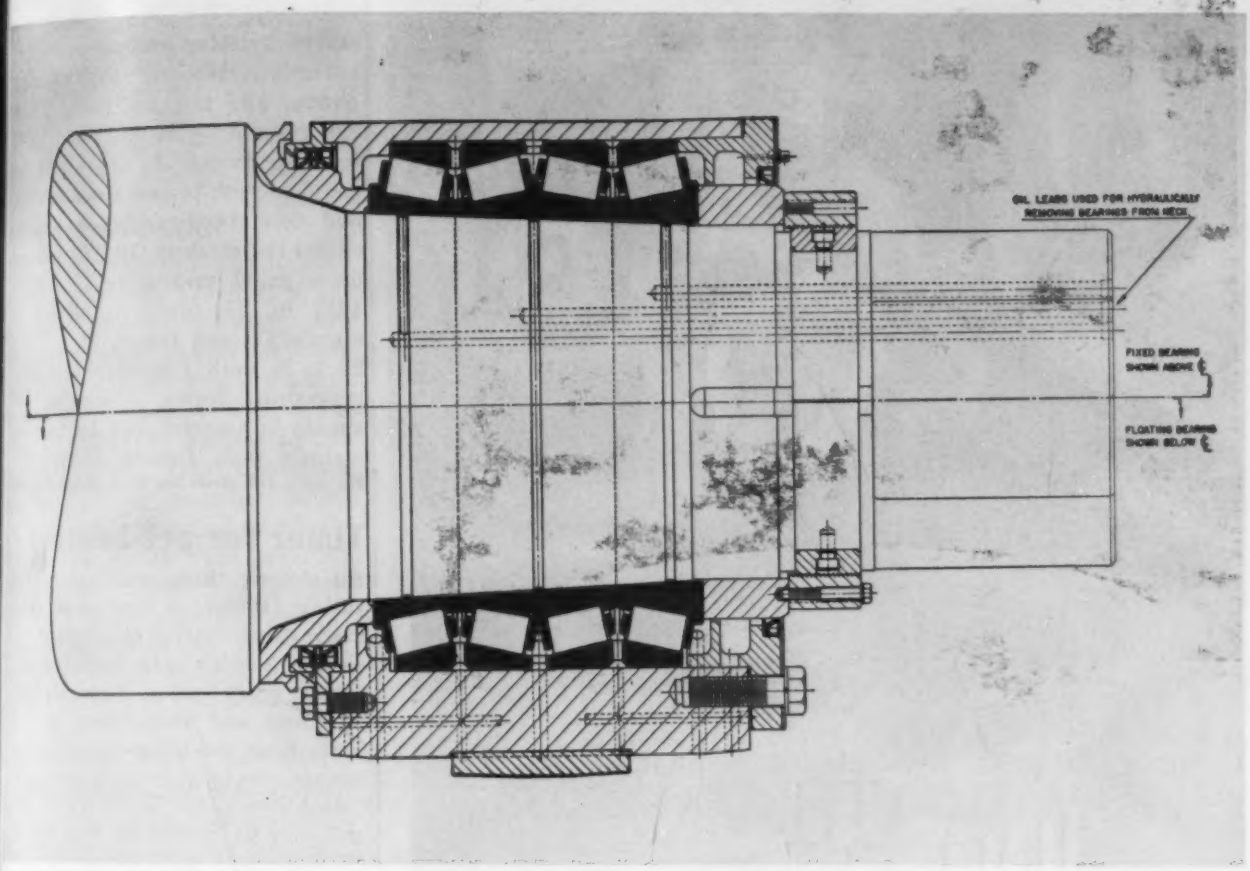
New tapered bore TIMKEN® bearing has interference fit—yet is easy to remove



THE world's first 4-row tapered roller bearing with a tapered bore—recently announced by The Timken Roller Bearing Company—is now in service at a mid-western steel mill. The new bearing provides maximum bearing capacity for high-speed roll necks, has an interference fit, yet can be quickly removed from the roll neck by expanding its cones hydraulically. Excessive scuffing and neck wear are eliminated.

Two-row Timken® roller bearings with double cone and tapered bore have been available for a long time. However, this is the first 4-row tapered bore bearing. It's the greatest development in roll neck bearing design since the Timken Company pioneered the first balanced proportion bearing in 1941.

Like other Timken roll neck bearings, this new tapered bore bearing permits maximum roll neck size and greater mill rigidity, eliminates the need for special thrust bearings and makes possible higher rolling mill speeds. Mills can be stopped and started without the loss of steel.

For additional information on the new 4-row, tapered bore bearing for roll necks, write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

FREE! NEW ROLLING MILL EQUIPMENT SECTION OF THE TIMKEN COMPANY'S ENGINEERING JOURNAL

Just off the press! 165 pages and over 400 design illustrations describe and illustrate bearing applications in all types of rolling mill equipment. Includes five pages on the new tapered bore, 4-row bearing. Write on your company letterhead to The Timken Roller Bearing Company, Canton 6, Ohio

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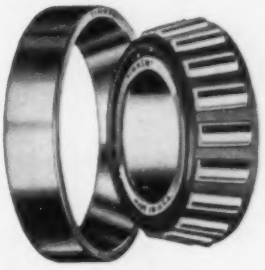
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ○ THE TIMKEN TAPERED ROLLER ○ BEARING TAKES RADIAL ○ AND THRUST ○ LOADS OR ANY COMBINATION

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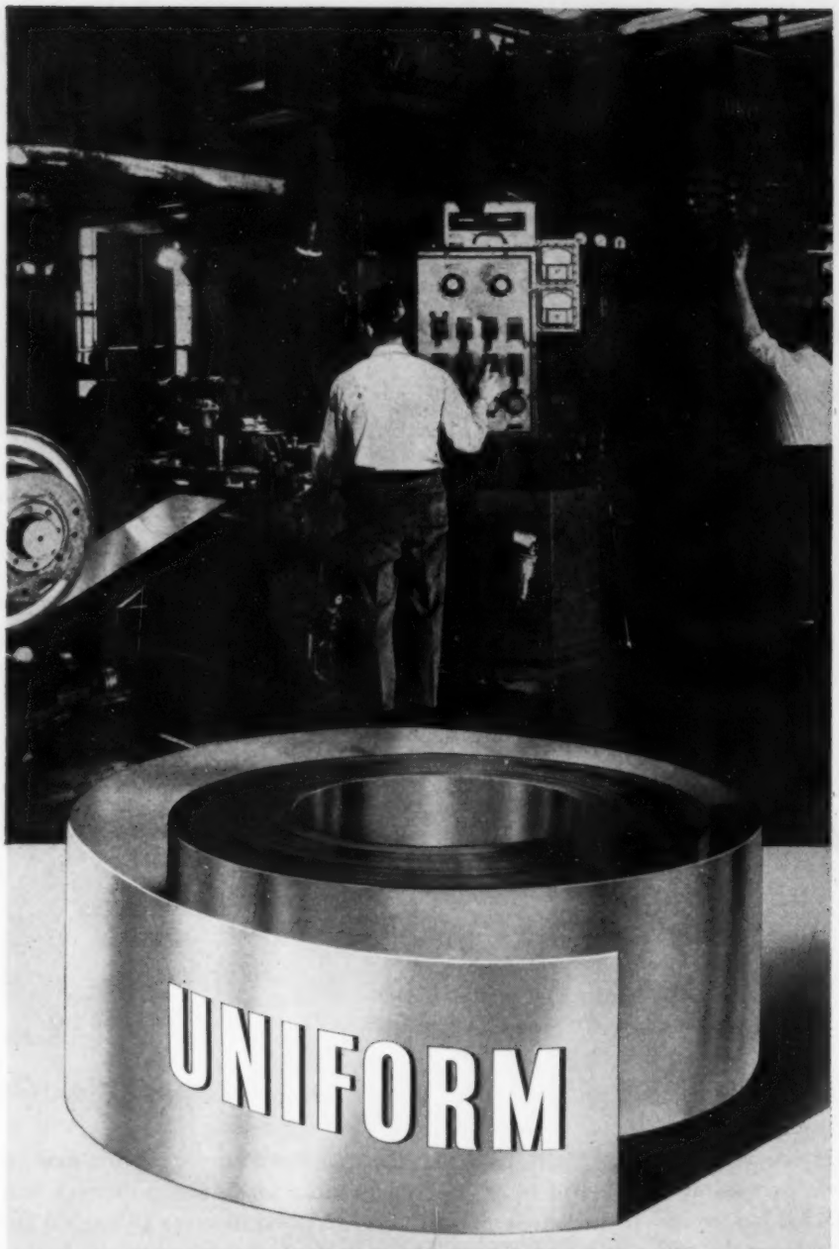

In this modern plant experienced workers, operating modern equipment with the newest and most efficient quality control devices, produce Wallingford strip steel and tubing of consistently uniform quality. In analysis, gage, temper, surface finish and every other respect Wallingford Steel meets specifications exactly. Whenever you reorder, in a week, a month or a year, the same uniformly high quality will be delivered. As a result your operations never need vary, the quality of your product will be as uniform as that of Wallingford Steel.

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—New Equipment—

Continued

Packaged drive system

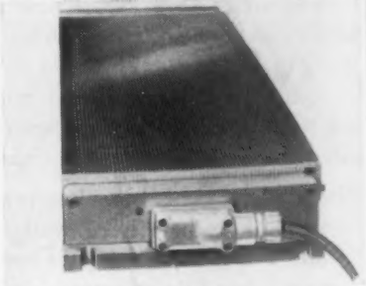
Designed for use on many types of equipment, including testing machines, printing presses, conveyers, variable-volume or proportioning pumps, and machine tools, a new electronic drive is available for ¾ to 3 hp drives. It offers stepless speed-control, pre-set speed control, and close speed regulation, and includes the smallest GE Thy-mo-trol drive panel, measuring 15 x 18 x 12½ in. The drive is offered in standard speed ranges of 5:1 and 20:1, in both reversing and non-reversing forms. Selection of speeds is accomplished by turning a single knob. *General Electric Co.*

For more data circle No. 40 on postcard, p. 99.

Timer for pre-heating

An electric timer with extra high rating (1650w) is used as an automatic time control attachment for electric heating pots, tumbling machines, small baking ovens, air conditioning and humidifiers, or for controlling the break-in period for motors, electronics equipment, etc. Called Two-Timer Model 2T-20, the unit can be pre-set to turn on or off a properly rated device plugged into it up to 20 hours ahead. *Vocaline Co. of America, Inc.*

For more data circle No. 41 on postcard, p. 99.



Power-grip chuck

A new magnetic chuck features multiple poles for full work surface holding area. Closely spaced separators are of 0.050 in. wide brass separated by a ⅛ in. wide mild steel spacer. The 100 pct silver brazed construction results in a very rigid base for precision grinding. The chuck has uniform holding power over entire face of chuck. *Sundstrand Magnetic Products Co.*

For more data circle No. 42 on postcard, p. 99.

All-purpose seal

New all-purpose mechanical seal, known as the John Crane Type 19, reportedly provides life-time performance in small pumps, hot water circulators, and other rotary shaft applications. Special beveled cones made of Teflon are utilized as the flexible member. This adapts the seal for services involving water, oil, corrosives or acids; temperatures from −100° to +450°F; vacuums and pressures to 200 psi; and high shaft speeds. Sizes fit shaft diameters of ¼, ⅜, ½, ⅝ and ¾ in. *Crane Packing Co.*

For more data circle No. 43 on postcard, p. 99.

Moisture-proof conduit

Sealtite flexible electrical conduit type UA has Underwriters' Laboratories approval for wet locations. Tough, extruded synthetic covering over flexible metal cores protects wiring against moisture, oil, dirt, chemicals, and corrosive fumes, on permanent and temporary installations. The conduit is made of spirally wound, interlocked zinc-plated steel strip with a copper bonding conductor wound spirally in the space between each convolution on the inside of the conduit. *American Brass Co.*

For more data circle No. 44 on postcard, p. 99.

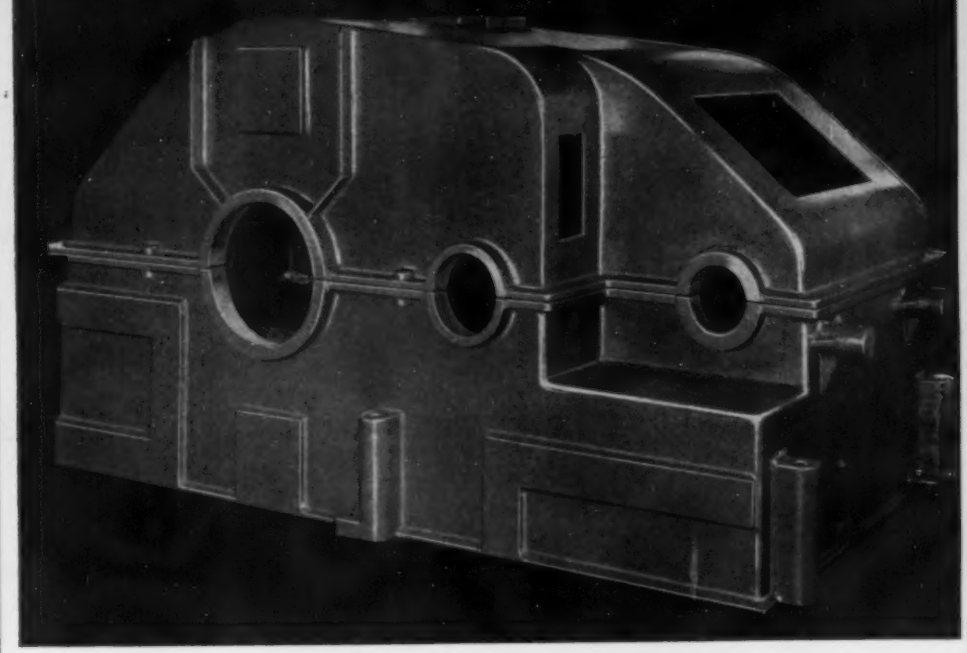
Electrode holder

The nose of a new 400 amp insulated electrode holder, the Cooltong, is special sandwich construction consisting of a copper core between four and six layers of laminated, glass impregnated, plastic cloth. This reinforces as well as dissipates heat, for longer service life. Jaws, covered by this insulating construction, are made of tough highly conductive, Mallory 3 Metal, non-spatter type. *Lincoln Electric Co.*

For more data circle No. 45 on postcard, p. 99.

Turn Page

use castings?



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Acme weldments are replacing castings for leading machinery and equipment manufacturers everywhere because they do a better job at lower cost. Experienced Acme engineers at work with Acme's complete fabrication facilities can give *you* these same advantages . . . Acme's new 24-page, illustrated booklet shows you why. *The Facts about Weldments and Castings* tells you what you should know about their relative strength, rigidity, vibration, design flexibility, and cost . . . facts to help you specify and save. And it's yours for the asking . .

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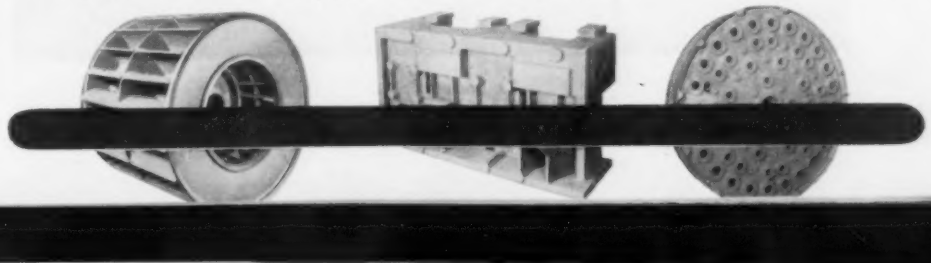

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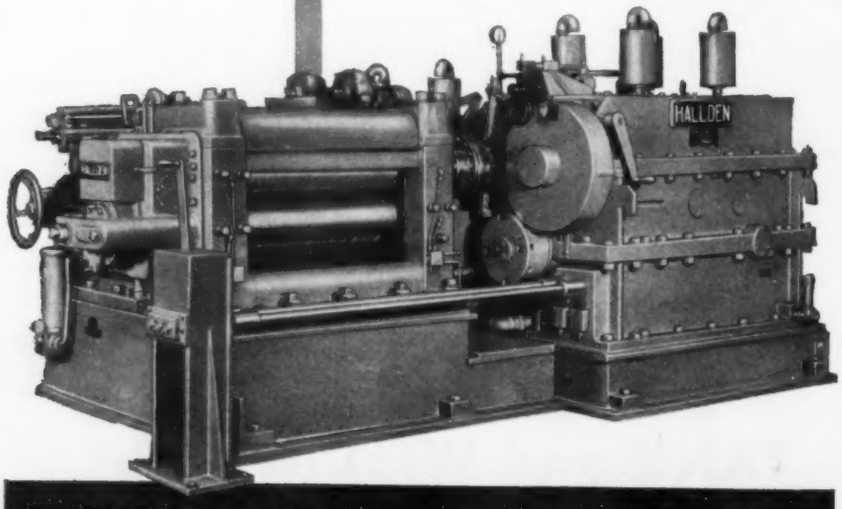

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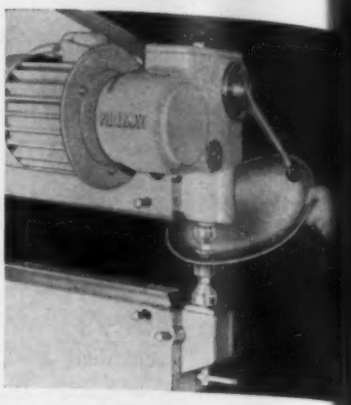

Dishing tools

New working tools for the Pullmax sheet metal working machines do a dishing operation that simulates stamping or spinning. Adjustment of lower tool permits any radius of dishing to be accomplished. The tool operates on all types of ferrous and nonferrous metals. *American Pullmax Co., Inc.*

For more data circle No. 46 on postcard, p. 99.

Jet cleaner

For making short work of heavy-duty cleaning jobs a new jet cleaner, the Speedylectric Hydrajet, provides 4 to 8 gal scalding hot soap and water per min at nozzle pressures up to 600 psi, under finger tip control of the operator. Its powerful pulsating hydraulic jet tears into and under heavy accumulations that defy ordinary cleaning methods. Suitable detergents or solvents may be introduced intermittently or continuously in any desired, automatically controlled concentration. *Livingstone Engineering Co.*

For more data circle No. 47 on postcard, p. 99.

Hot-spot lubricant

A new lubricant for use at temperatures of 500°F and over, Hi-Temp 303, is light enough to be fogged easily in automatic lubricators yet provides high load carrying protection. It combines molybdenum disulphide with a synthetic base and a pure, low-carbon-content petroleum oil. These properties are said to impart exceptional lubricity, high resistance to heat breakdown and reduce carbon build-up to a minimum on bearings exposed to elevated temperatures. *E. F. Houghton & Co.*

For more data circle No. 48 on postcard, p. 99.

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The Iron Age

SALUTES

Frederick K. Daggett

He has built a 6 year old business to an annual volume of $2 million by his varied talents.

VERSATILE is the word for Ted Daggett. Primarily an air conditioning engineer, he has worked for a corset manufacturer, made side trips into book publishing and the Coast Guard.

At the close of World War II he found himself working for Warner Brothers, Bridgeport, Conn., corset maker. There Ted managed the production of lightweight flexible tubing developed by the Navy.

He was excited by the industrial possibilities of the tubing. But Warner wanted to concentrate on corsets after V-J Day. So Ted hustled up money, formed Flexible Tubing Corp., and, in 1947, took over the product.

He started in a shed in Branford, Conn., with three employees and first year sales of $250,000. Business was over $2 million in 1952, employed over 200.

Success has been mainly due to Ted's skill as engineer and salesman. He has found new uses for his tubing and designed new tubings to fit special needs. He proved his sales ability from the start by getting backing from two hard-bitten investment firms.

A hard worker, Ted relaxes by hunting and fishing. But his great love is sailboat racing. He is an executive of practically every group he belongs to—business and social, and is vice-president and director of National Metal Trades Assn. All these posts are tributes to his executive ability.

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for springs that keep their spring

WIRE

WICKWIRE GAMMA SPRING

Upholstery springs made from Wickwire Gamma Spring Wire can be counted on for long-lasting retention of resiliency.

Wickwire Gamma Spring Wire is always uniform in quality and tensile strength because it is a product of fully integrated facilities... which means complete control of materials, manufacture and testing from ore to finished wire.

Whatever your needs in specialty steel wires... high or low carbon steel... round or shaped... in all tempers, grades and finishes — For the Wire You Require, Check With Wickwire.

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CF&I

1262

The Iron Age INTRODUCES

Harold E. Townsend, appointed sident, TRAYER PRODUCTS, C., Elmira, New York.

C. D. Leiter, elected vice-president charge of sales, THE F. E. MYERS BRO. CO., Ashland, Ohio; and W. B. llogg, elected vice-president and ex- t sales manager.

Dr. Brian O'Brien, appointed vice- sident in charge of research, MERICAN OPTICAL CO., South- dge, Mass.

Henry S. Elder, promoted to vice- sident, TITEFLEX, INC., Newark, J.; George K. Licht, elected vice- sident in charge of production; d John J. Phillips, promoted to e-president in charge of sales and gineering.

I. John Billera, elected treasurer, ESSED STEEL CAR CO., INC., icago offices.

P. H. Richey, elected assistant trea- rer, DETREX CORP., Detroit; and J. Chmielnicki, named assistant sec- ary.

Robert W. Pelz, appointed assistant the director of research, FERRO RP., Cleveland.

Leo S. Sullivan, named vice-presi- t in charge of the Automotive & ro Sales Div.; THE RUSSELL FG. CO., Middletown, Conn.; Peter Madsen, named vice-president in arge of the Belting Sales Div.; uce S. Williams, becomes vice-presi- t in charge of material and pro- ction control; and A. Paul Smith, named secretary.

Dr. Sylvan Wallach, appointed sen- scientist on reactor design devel- ment, WALTER KIDDE NUCLE- LABORATORIES, Garden City, Y.

Emil A. Vierow, appointed superintendent, Youngstown district Fuel & Power Dept., THE YOUNGSTOWN SHEET & TUBE CO.

Robert F. Bole, elected executive vice-president, ATLAS FENCE CO., Philadelphia, **George J. Hanhauser,** elected vice-president; and **J. H. Rementer,** elected secretary-treasurer.

W. C. Safford, appointed assistant division superintendent, Hot & Cold Strip and Sheet Mills, Midland Works, CRUCIBLE STEEL CO. OF AMERICA; and **Alex DeBlander,** appointed superintendent, Cold Strip & Sheet Dept.

Jesse E. Deacon, appointed assistant superintendent, Contract Div., THE TAFT-PIERCE MFG. CO., Woonsocket, R. I.

Earl F. Oyster, becomes staff engineer, SPO INCORPORATED, Cleveland.

John E. Canaday, promoted to corporate director of public relations, LOCKHEED AIRCRAFT CORP., Burbank, Calif.; and **Don H. Cameron,** promoted to corporate director of industrial relations.

Edmund S. Ruffin, Jr., secretary and chief counsel and manager of the law department, KOPPERS CO., INC., Pittsburgh, was appointed a departmental vice-president.

Gene B. Spaulding, promoted to superintendent of Electronics, TEMCO AIRCRAFT CORP., Dallas; and **Leon W. Mason,** promoted to assistant superintendent of electronics.

T. R. Handel, named general superintendent of operations, THE CLEVELAND CARTAGE CO., Cleveland.

Jerome L. Maxwell, appointed engineering assistant to the contract administrator, ENGINEERING & RESEARCH CORP., Riverdale, Md.

WILBUR C. STAUBLE, elected president and chief executive officer, The Holo-Krome Screw Corp., Hartford, Conn.

E. D. POWERS, vice-president and director, American Cyanamid Co., also elected president, Chemical Construction Corp.

LAWRENCE H. FLORA, appointed director of engineering, Tinnerman Products, Inc., Cleveland.

Personnel

Continued

Robert E. Eirons, appointed plant metallurgist, Massillon plant, Union Drawn Steel Div., REPUBLIC STEEL CORP., Cleveland.

Henry F. Peters, becomes manager, Technical Service Dept., LUKENS STEEL CO.; and **John P. Andrews**, becomes sales engineer, Lukenweld Div.

Harold E. Kleintop, appointed manager of wire product operations, HEWITT-ROBINS, Philadelphia plant.

Philip A. Gaebe, appointed senior sales engineer for basic refractories and chemicals in the Pittsburgh area for the Chemical Div., KAISER ALUMINUM & CHEMICAL SALES, INC.

Robert S. Putnam, apppointed industrial relations division manager, San Diego plant, SOLAR AIRCRAFT CO.

C. W. Barnthouse, Jr., appointed assistant district manager, Los Angeles sales office and warehouse, LATROBE STEEL CO.

E. F. Mitchell, appointed Detroit district manager, SIMONDS ABRASIVE CO.

William H. Neil, named regional manager, St. Louis territory, ADMIRAL CORP.; **Charles F. Gill**, appointed Kansas City regional manager; and **Ralph C. Routsong, Jr.**, named Louisville regional manager.

William C. Wilson, appointed sales manager, MESTA MACHINE CO., Pittsburgh.

James D. Wilkinson, appointed manager, Market Research Div., BECKMAN INSTRUMENTS, INC., South Pasadena, Calif.

David C. Lewis, named manager, REYNOLDS METALS CO., Kentucky general sales office; **Wharton L. Donaldson**, named manager of packaging sales, Central region, Chicago office; **Hugh Bynum**, named manager, general packaging market, Louisville office; and **W. B. Moore**, named manager, Chemical & Petroleum Market Sales.

JOHN W. GOSSELIN, appointed assistant to the president, Phoenix Mfg. Co., Joliet, Ill.

ROBERT B. TAGGART, appointed chief industrial engineer, Watertown, Div., The New York Air Brake Co.

H. M. WILLIAMS, appointed equipment engineer, Olin Industries, Inc., East Alton, Ill.

WILLIAM G. FIENEMANN, appointed assistant sales manager, Worcester Pressed Steel Co.

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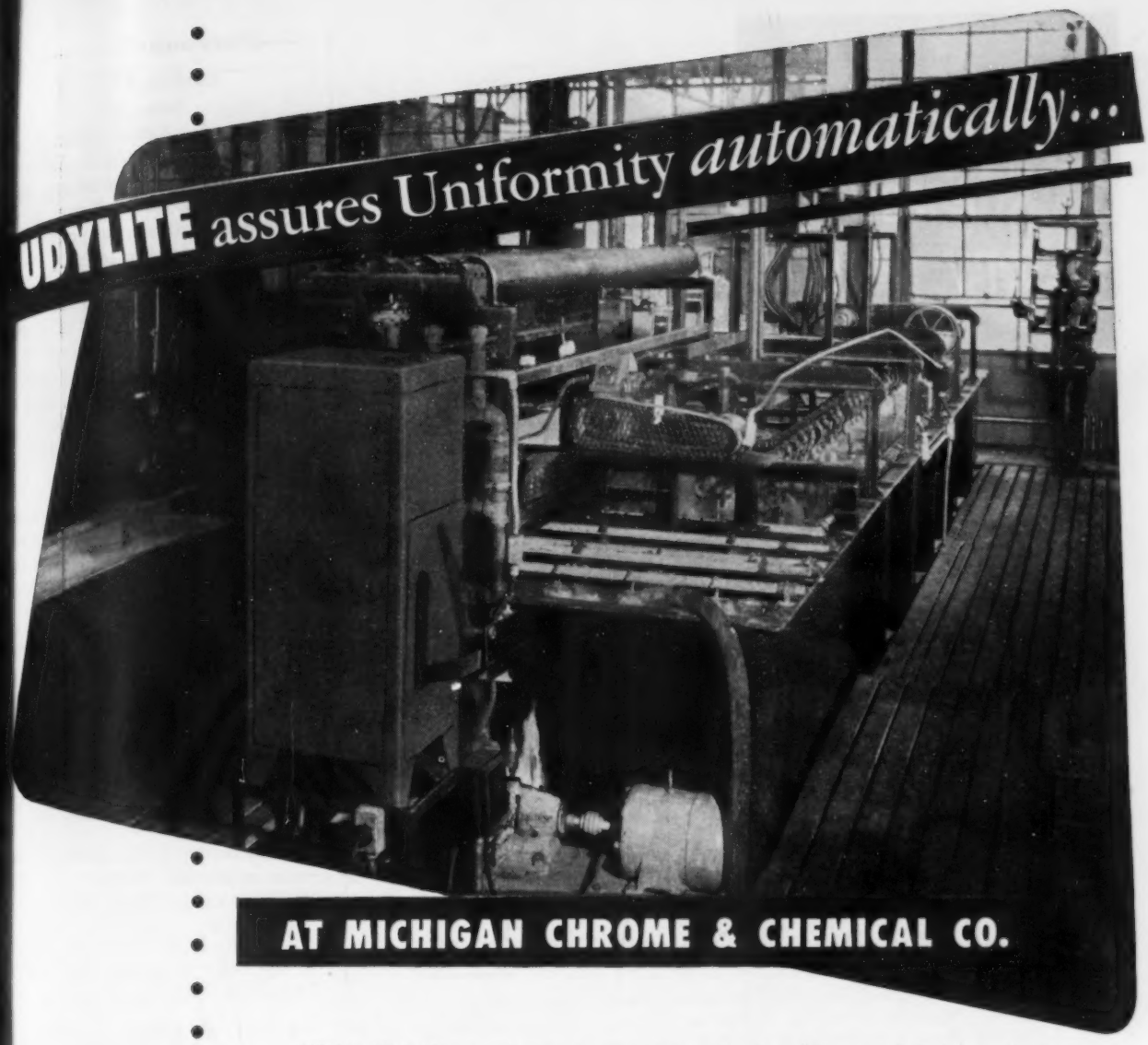

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—Personnel—

Continued

Elden L. Auker appointed s... manager, BAY STATE ABRASI... PRODUCTS CO., Westboro, M... succeeding **E. Halsey Brister**, who ... been named director of product de... opment and quality control.

J. O. Phillips, named assistant ... the general manager of sales, H... PENSTALL CO., Pittsburgh; R. ... **Heppenstall, Jr.**, named manager ... market research; **Harold F. Wood**, ... becomes manager of knife sales; ... **Ward E. Duchene**, named manager ... material handling sales.

Richard E. Reiter, named super... tendent of the Landing Gear D... WILLYS-OVERLAND MOTOR... INC., Toledo.

James R. McCutcheon, Jr., ... pointed sales manager, Valve D... HOMESTEAD VALVE MFG. C... Coraopolis, Pa.

Devon W. Fryback, named sa... manager, Eastern region, Industr... Div., MINNEAPOLIS-HONEYWEL... REGULATOR CO., Philadelphia.

H. J. Howerth, Jr., named assista... sales manager, Wayne Div., GA... WOOD INDUSTRIES, INC.

John E. King, appointed assista... to the sales manager, WORCESTE... PRESSED STEEL CO., Worcester.

Robert W. Jeffery, appointed ge... eral sales manager, CURRIER C... Oakland, Calif.

Frank W. Jones, appointed gener... sales manager, THE BRADFOR... MACHINE TOOL CO., Cincinnati.

Walter A. Stuhr, appointed region... sales manager, Chicago office, MA... FRAN ENGINEERING, INC., Cleve... land.

J. W. Morgan, apppointed assista... sales manager, eastern industri... truck sales, HYSTER CO., Portland, Ore.

F. Steele Blackall, III, appointe... assistant general manager, THE TAFT-PIERCE MFG. CO., Woon... socket, R. I.

O. D. Lloyd, appointed sales mana... ger, Louisville Corrugated Div., GEN... ERAL BOX CO.

Morris Evans, appointed to regiona... office at Houston, Texas, COOPER... BESSEMER CORP., Mt. Vernon, Ohio.

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Personnel

Continued

James W. Tweedy, Jr., named new executive vice-president and general manager, REDMOND CO., INC.

A. L. Danielson, appointed manager, Denver branch office, BAILEY METER CO., succeeding **G. M. Wallace,** who has been appointed an assistant sales manager, Cleveland.

Claude A. Gates, appointed representative, CLAUD S. GORDON CO., Chicago.

Jack O. Coffey, appointed aircraft sales manager, South Wind Div., STEWART-WARNER CORP., Indianapolis.

J. C. Thorburn, appointed branch manager, Manufacturing & Repair plant, Buffalo, WESTINGHOUSE ELECTRIC CORP., Pittsburgh.

Fred Rimmler, appointed plant manager, JOHN VOLKERT METAL STAMPINGS, INC., Queens Village, New York.

Pembroke W. Taylor, named manager, Distributor Sales, THE RIVERSIDE METAL CO., Riverside, N. J.

H. D. Hughes, appointed general sales manager, UNION CARBIDE & CARBON CORP., New York; and **E. E. Fogle,** named sales manager, Industrial Chemicals Div., Carbide & Carbon Chemicals Co., a division of the parent company.

Oscar F. Stewart, appointed executive staff assistant, COMMERCIAL CONTRACTING CORP., Detroit office.

OBITUARIES

Gustavus Adolphus Axelson, 82, retired head of Axelson Mfg. Co., Los Angeles, at his home in Los Angeles recently.

Frank H. Gordon, 74, retired vice-president, Lukens Steel Co., Coatesville, Pa.

Ralph B. Dimmick, 69, consulting metallurgist, Armco Steel Corp., Middletown, Ohio, of a heart attack at Deerfield Beach, Fla., recently.

Melvin H. Kuhl, 52, assistant general manager, Industrial Div., The Timken Roller Bearing Co., Canton, Ohio.

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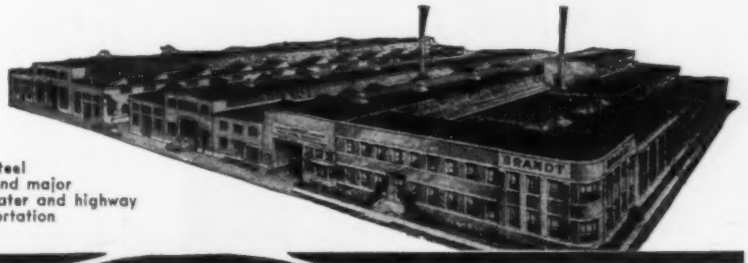

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Technical Articles

Substitution problem—

How and Where to Use 430 Stainless

- If you are having trouble getting 18-8 type stainless, take another look at the straight chromium grades.
- Re-examine service conditions . . . Where corrosion is mild, type 430 makes an excellent substitute . . . Where corrosion conditions are severe, use 442.
- Best chances for substitution are where corrosion conditions are of prime importance and other special mechanical properties are not needed.
- While welding affects properties of the straight chromium steels, they can be used in the as-welded condition in some applications. . . . A simple heat treatment restores weld properties of the base metal.

By R. A. Lincoln and T. A. Pruger
Sales Development and Engineering Service Dept.
Allegheny Ludlum Steel Corp.
Pittsburgh

Part I

◆ SINCE THE KOREAN WAR, manufacture of many civilian articles containing nickel has been sharply curtailed due to (1) limited production of nickel, (2) soaring defense demands for nickel and nickel-bearing alloys, and (3) government stockpiling of nickel.

The wide range of applications of stainless steels makes substitution problems difficult. In the category of strategic steels with limited civilian uses are the chromium-nickel or austenitic stainless steels.

Type 302 and 304 with 18 pct Cr and 8 pct Ni are representative examples. These grades are characterized by high tensile strength (90,000 psi) and excellent ductility (50 to 60 pct elongation). High elongation values and the considerable spread between yield and tensile strengths, which provide a large plastic range, are characteristic of a steel with excellent drawability and formability. These steels have the unusual property of rapid work hardening.

The austenitic chromium-nickel stainless steels are also used in applications where high tensile strength is required such as truck trailers and railway cars. Their high rate of work hardening places them in a very advantageous position over other materials since tensile strengths over 200,000 psi can be obtained by cold reduction. Springs and fire extinguishers are other end uses for high tensile chromium-nickel stainless steels.

Type 302 is readily welded by all conventional methods. The weld deposit is soft and ductile and, with the exception of a slight increase in grain size, is comparable to the annealed base metal. It is not necessary to anneal the welds, and large dairy units and tanks are used in the as-welded state. From the standpoint of corrosion resistance, the chromium-nickel stainless steels are in a class by themselves. They are excellent for general overall corrosion resistance

In many applications it is possible to substitute from the straight chromium series . . .

both for indoor and outdoor application. This applies to the base and the weld metal.

In substituting a stainless material for chromium-nickel stainless steel such as type 302, the important properties of these austenitic stainless steels, Table I, must be considered. In many applications it is possible to substitute a stainless steel from the 400 or straight-chromium series. In making such substitutions, it is necessary to restrict them to applications requiring properties that the grades have in common or modify the service conditions to conform..

Corrosion resistance and oxidation resistance improve with increasing chromium content so that type 446 has better overall corosion resistance than type 442 and type 442 in turn is better than type 430. The straight-chromium steels become less ductile with increasing chromium contents.

TABLE I

SALIENT PROPERTIES OF 18-8

1. High tensile strength with values as high as 200,000 psi.
2. Excellent ductility of both the base and weld metal.
3. Good corrosion resistance in the base and weld metal.
4. Excellent impact strength at extremely low temperatures; impact values at minus 320°F are comparable to room temperature impact strength.
5. High temperature strength.
6. Nonmagnetic properties.

The microstructures of annealed types 430, 442 and 446 are ferritic. In addition to the ferrite there are some carbides interspersed throughout. A change in microstructure occurs when type 430 is welded or heated to elevated temperatures. In welding, some austenite forms at high temperatures which transforms to martensite at lower temperatures. This austenite to martensite transformation is similar in nature to the hardening of high-carbon steels.

Fig. 1 depicts the structure of annealed type 430 on the left. This microstructure consists of ferrite grains and some carbides. Annealed type 442 and 446 have similar microstructures. On the right is the heat-affected zone of welded type 430. Large grain size and brittle martensitic sheaths in the grain boundaries predominate. Since the martensite is extremely hard and brittle, ductility of welded type 430 is low. Bends in this event on welded type 430 are poor and it is necessary to anneal at 1450°F to overcome this deficiency.

A Guide In Making —Corrosion Resistance Tests—

When discussing relative corrosion resistance of two alloys, it is important that available data be applicable to the conditions under consideration. Differences in corrosion resistance will be noted only under conditions where each of the alloys tested is susceptible to attack. Misleading results may be obtained if alloys are tested under corrosion conditions considerably more severe than will be encountered in service. One other important consideration is whether or not conditions of fabrication alter corrosion resistance. This makes it necessary to give consideration to the condition of heat treatment of the sample tested and be certain it is representative of fabricated material.

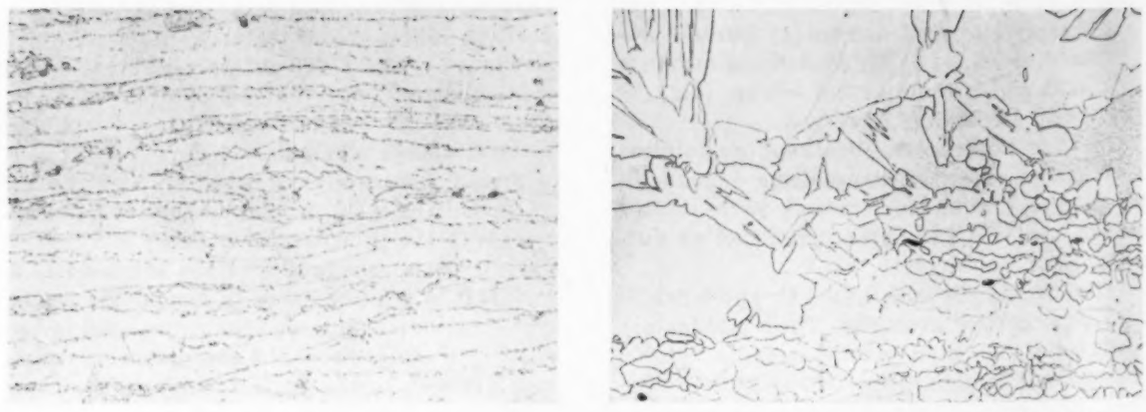

FIG. 1—Annealed 430 shows ferrite grains and some carbides. Welded 430, right, in heat-affected zone shows large grain size, martensite in grain boundaries. Ductility of welded 430 is low. 200X.

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When comparing corrosion resistance of different grades of stainless steel, these factors, Table II, must be considered as standards for evaluating each result.

If corrosion conditions are mild such as is usually encountered in simple atmosphere where moisture and air alone are encountered, both type 430 and austenitic 18-8 type stainless steels will remain unaffected for long periods of time. Tests under these conditions will reveal no difference in the corrosion resistance of the two. In household appliances where heating is not involved, and periodic cleaning is expected, similar results would be obtained and no difference would be noted normally. In order to show a difference in the corrosion resistance of type 430 and 18-8, conditions of corrosion would have to be made more severe.

This increase in severeness of corrosion conditions could occur in a number of ways. These would include increase in period of exposure before drying or cleaning, presence of acid fumes or salt dissolved in moisture, presence of stress, increase in temperature at which corrosive liquid is in contact with metal, and roughening of surface.

Under mild and simple atmospheric corrosion conditions where only moisture is encountered or in household and soda fountain equipment such as sink bowls and drainboards, where cleaning of the surface is expected, type 430 weld areas would be expected to stand up without subsequent treatment after welding. However, where more severe corrosion conditions are present and welds are present, the effect of welding may be harmful and require further consideration.

The effect of finish, important in all stainless steels, is of more noticeable importance to type 430 than to the more corrosion resistant grades. Type 430 has best corrosion resistance in the buffed condition or in the mill-finished condition where thorough pickling has removed last traces of scale. Rough-ground surfaces show greater susceptibility to corrosion. These conditions are important to a steel such as type 430 under mild corrosion conditions because it is closer to its borderline of corrosion resistance. The effect of rough grinding probably becomes important in the corrosion resistance of 18-8 under more severe conditions of corrosion.

Types 430 and 442 are the grades of straight-chromium steels with corrosion resistance closest to making a satisfactory substitute for 18-8. To compare the relative corrosion resistance of these steels, consider the results of the standard Huey test in boiling 65 pct HNO_3 for five 48-hr periods. In this test, the weight losses are averaged and converted to inches penetration per month. The test conditions produce actual solution of the metal and differences determined in this test would not be found under conditions of mild atmospheric corrosion.

Penetration figures

In the Huey test, type 430 properly heat treated usually has a rate of attack of 0.004 to 0.005 n. penetration per month. In a few cases, results as low as 0.0026 in and as high as 0.008 in. have been obtained. In the Huey test, type 442 in the properly annealed condition usually has a rate of attack of approximately 0.001 in. penetration per month. Most of the tests run on type 442 in the properly heat-treated condition would fall in the range of 0.0007 to 0.0013 in. penetration per month. Similar tests on type 302 or type 304 stainless steel in the properly annealed condition give results less than 0.002 in. penetration per month.

On the basis of a standard laboratory test, it is not possible to predict exactly the behavior of alloys in all types of service. However, laboratory tests give results that can be taken as indications to be confirmed by service tests. The above test results indicate that as corrosion conditions become more severe than those of mild atmospheric conditions, type 430 stainless

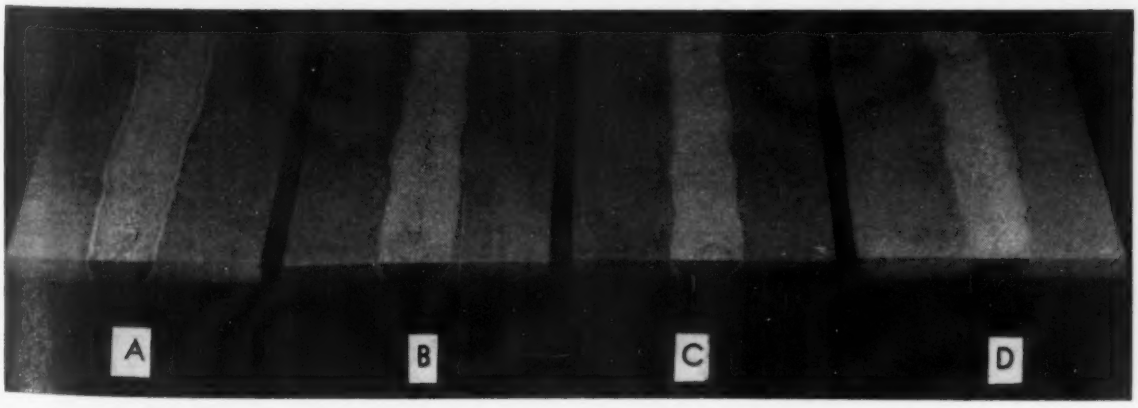

FIG. 2—Attack adjacent to welds shows in these samples of 17 pct Cr stainless welded with 17 pct Cr rod and boiled 144 hr in 65 pct nitric acid. Samples: A, as-welded; B, C, and D, heat-treated and air-cooled.

Lower corrosion resistance at weld areas in straight chromium grades can be offset by a simple heat treatment at 1450° F.

steel will corrode more easily than either type 442 or type 302. Type 442 and type 302 would be expected to have the same degree of corrosion resistance. Tests in 20 pct salt spray agree with these generalizations.

Type 430 should be a satisfactory substitute for type 302 in many applications where corrosion conditions are mild. Although welding lowers the corrosion resistance of 430, welds show only slight attack after long exposure to atmospheric conditions. Under more severe conditions of corrosion where the full corrosion resistance of type 302 is necessary, type 442 offers the possibility of equal corrosion resistance if welding is not necessary. If welding is involved, it is possible to restore satisfactory corrosion properties to weld areas by heat treatment at 1450°F.

The behavior of straight-chromium welds is of extreme importance at this time when considerable substitution of straight-chromium steels for the austenitic chromium-nickel grades is being forced by the scarcity of nickel. The details reported here are from preliminary tests conducted in the laboratory, which do not necessarily simulate conditions in the field. The initial tests indicate (1) a lowered corrosion resistance at weld areas and (2) a restored corrosion resistance by simple heat treatment at 1450°F.

Tests on sheet and strip

Tests have been made on Heliarc welds, hand arcwelds in which a filler rod was deposited, and resistance welds. Most tests to date have been in light-gage sheet and strip. Both type 442 and type 430 are susceptible to rapid attack in the weld area in the Huey Test, the Krupp Test, boiling sulfuric acid-copper sulfate solution, hot nitric-hydrofluoric-acid test at 180°F, and in cold 5 pct sodium-chloride solution which was used as representative of a mild corrosive medium.

Fusion welds in both type 430 and type 442 with and without the addition of titanium, in the as-welded condition, are severely attacked in one or two 48-hr periods in boiling concentrated 65 pct HNO_3. Similar samples cracked open along the weld after 48 hr in the Krupp Test, with one exception.

When titanium equal to eight to ten times carbon content is present, the samples were satisfactory after 48 hr in the Krupp solution. In similar samples immersed in a 5 pct NaCl solution at room temperature, considerable rusting took place in the area of the weld in less than 16 hr, while samples in the humidity test were satisfactory after 30 days, but showed some light rusting in weld areas after 175 days of continuous exposure to the 100 pct humidity atmosphere at room temperature. Welded type 430 samples exposed to the outdoor atmosphere in the Brackenridge Plant of Allegheny Ludlum showed a greater tendency to pit in the weld area after 10 years' exposure.

TABLE II

CHECK THESE IN SWITCH TO 430

1. Do the service conditions involve mild atmospheric conditions?
2. If stronger than mild atmospheric corrosion is involved, is the exposure intermittent with periodic cleaning?
3. Is welding involved in the fabrication?
4. Surface finish effect.

Attack adjacent to weld

Tests in boiling nitric acid show that the straight chromium steels are susceptible to intergranular corrosion under some conditions. Fig. 2 shows samples of type 430 containing 0.08 pct C and 17 pct Cr that were arcwelded with a filler rod of the same composition and were exposed to boiling 65 pct HNO_3 for 144 hr. The samples from left to right are "A" as-welded; "B" heated 1 hr at 1200°F and air-cooled; "C" heated at 1300°F and air-cooled; "D" heated for 1 hr at 1400°F and cooled. Fig. 2, in the as-welded sample, shows a line of attack immediately adjacent to the weld.

Extent of attack is more easily recognized at the end of the samples, but it is of similar degree all along the flat surface immediately adjacent to the weld. Treatments of 1 hr at 1200° and 1300°F lessen the severity of attack, but a marked improvement is not attained until the 1400°F treatment is applied.

Annealing welds helps

A study was made of corrosion found in the heat-affected zone of 430 welds. A sample tested was heated 30 min at 2100°F to simulate the temperature attained by the metal adjacent to the weld and then exposed to boiling 65 pct HNO_3 for 96 hr. Attack was confined mostly to areas around the grains. Some grains actually fell out. Similar results are obtainable with type 430 containing titanium. The annealing treatments outlined previously have to be used in order to restore corrosion resistance to weld areas—even though the steel contains titanium in amounts in the order of seven times the carbon content.

Type 430 and type 430 containing titanium, in the mill-annealed condition have good resistance to boiling 65 pct HNO_3. Tests on these two alloys in the mill-annealed condition show

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corrosion rates in the range 0.003 to 0.007 in. penetration per month and approximately 0.001 in. per month for type 442. There is no evidence of intergranular attack in either the Huey or the Krupp Test—provided the material is properly annealed.

In the inert arcwelding processes, the titanium is retained in the weld of type 430 containing titanium. The weld has good mechanical properties but low corrosion resistance unless given a treatment of approximately 5 min at 1450°F. If regular type 430 is given this treatment after welding, it will have just as good corrosion resistance and mechanical properties —so that it is questionable whether the titanium-bearing grade will have much use outside of resistance welding applications, or for special mechanical properties.

Titanium additions to type 430 do not improve the resistance of inert arcwelds to the boiling HNO_3 test. In most tests, the corrosion rates of welds in boiling nitric acid were higher when the type 430 contained titanium than when it did not. Figs. 3 and 4 show specimens of both grades after testing in boiling 65 pct HNO_3. Titanium present in the proper amounts tended to prevent intergranular corrosion as measured by the Krupp Test.

More chrome builds resistance

Duplicate weld samples of type 430 were treated for 5 to 10 min at 1450°F and found to stand up very satisfactorily in all of the foregoing tests. The higher chromium type 442 is susceptible to the same behavior but to a slightly less degree than type 430. It is, however, sufficiently susceptible to corrosive attack in the as-welded condition to question whether it is usable in that condition when severe corrosion conditions are anticipated. Type 442 welds have to be treated for ½ hr at 1450°F to restore normal corrosion resistance.

Mill-annealed samples of type 442 and type 442 containing titanium have corrosion rates in boiling 65 pct HNO_3 of 0.0007 to 0.0013 in. penetration per month and compare favorably with type 302. Because of the higher chromium content, these grades have a definite advantage in corrosion resistance over type 430 and type 430 containing titanium. Mill-annealed types 442 and 442 containing titanium, like their 17 pct Cr counterparts, are subject to intergranular corrosion after welding by fusion processes.

Fig. 5 shows a typical inert arcweld of type 442 subjected to five 48-hr periods in boiling HNO_3 and 200 hr in copper sulfate. The heat-affected zone shows a line of attack immediately adjacent to the weld in the test in boiling HNO_3, while the other sample cracked after boiling in the Krupp solution. During the test, particles of copper plated out on the heat-affected zone. It was necessary to anneal type 442 at 1450°F for ½ hr in order to restore full corrosion resistance to the weld area.

No explanation of the mechanism by which corrosion of weld area metal takes place is possible at this time. The condition can be corrected by heat treating at 1450°F, and it may be worthwhile to seriously consider heat treating all straight-chromium welded structures where corrosion resistance against anything stronger than moisture is involved.

Susceptibility to intergranular corrosion in straight-chromium steels is produced by rapid cooling from temperatures over 2000°F, and is corrected by tempering at 1450°F.

In the regular type 430 welds, considerable austenite and martensite may be present at the grain boundaries of the ferrite. In the grades to which titanium has been added, however, the formation of austenite is suppressed; and, on the basis of microscopic examination, none is found in the heat-affected zones adjacent to the welds.

Part 2 of this article will appear in next week's issue of The Iron Age.

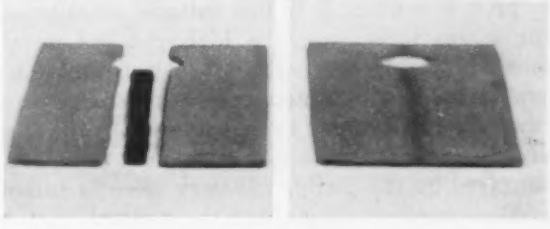

FIG. 3—Corrosion rates of welds in type 430 were tested by boiling in 65 pct nitric acid. Corrosion penetration in the as-welded condition, left, was 0.005 in. per month. Penetration in a sample heat treated at 1450° F for 5 min, right, was 0.004 in. per month.

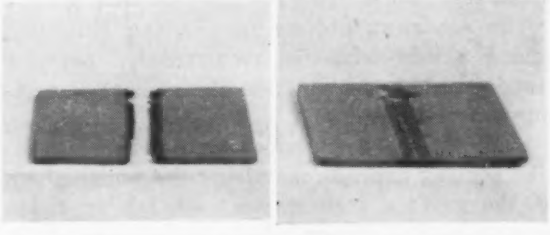

FIG. 4—Corrosion rates were higher where titanium was added to type 430. Tested in boiling 65 pct nitric acid, penetration was 0.044 in. per month for as-welded 430 Ti, left. But, heat treated at 1450°F for 5 min, penetration was cut to 0.025 in. per month.

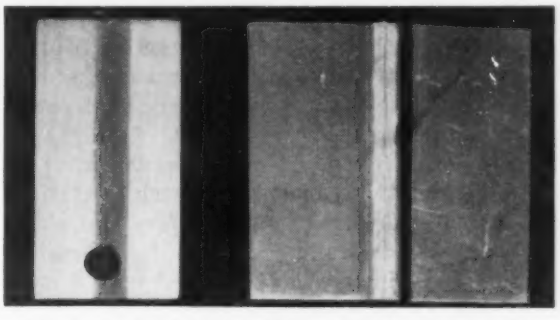

FIG. 5—Typical inert arcweld of type 442 after five 48-hr periods in boiling HNO_3 and 200 hr in $CuSO_4$.

For a better finish—

Can You Use These

◆ Disposal of waste solutions becomes a more critical problem as water resources diminish . . . Emphasis is on recovery and regeneration rather than disposal.

◆ Chemical polishing of aluminum is now established procedure . . . Five new solutions are disclosed, one having exceptionally low chemical concentration.

◆ Addition of indium sulfate to a chromium solution produces deposits free from cracks and roughness . . . Commercial application must wait for lower costs.

◆ Radioactive tracers prove that the sulfidic sulfur atom attaches itself to a silver surface deposited from a cyanide bath.

◆ THE SCRAMBLE to find suitable substitutes for scarce nickel was the highlight for metal finishers during the past year. Although white brass filled a minute gap, results generally were inversely proportional to the efforts.[1] At the end of last year, all other metals and chemicals employed by the plating industry were in fairly good to excellent supply, but the available nickel was being spread thinner.

In the field of metal cleaning, use of radioactive tracers provided some fundamental data and made possible measurement of cleaner effectiveness.[2] Other test methods included a water break test[3] and a dye absorption technique.[4]

The American Society for Testing Materials issued a new tentative recommended practice standard on the preparation of zinc-base diecastings for plating.[5]

Scale removal from hot-worked steel by induction heating depends on raising the temperature of the surface scale rapidly enough to cause expansion to a degree where it separates from the cooler base metal.[6] Its advantages are possible continuous operation, no acid disposal problem, low operating costs and small space requirements. The process is used for articles of regular cross section and only where a relatively thick scale is involved. High initial investment and possible incompleteness of descaling at 350°F, the temperature employed, are some of the disadvantages. The process will produce work clean enough for subsequent machining.

Scale removal from hot-rolled stainless steel in continuous strip, commonly a batch operation requiring a scale-breaking step before acid pickling, was successfully executed by abrasive blasting. The installation[7] required only 5 men as against 24 for batch pickling.

The problem of what to do with waste pickling solutions, which with higher steel production is becoming more critical as municipalities find their water resources diminishing, has been receiving much attention by researchers. Major emphasis is placed on recovery and regeneration rather than on disposal. The relatively low solubility of ferrous sulfate in concentrated sulfuric acid offers a favorable method of treatment.

A number of variations were disclosed in both the technical and patent literature. Processes employed in sulfuric acid regeneration by concentration were described[8] and a patent issued to Swindin.[9] A new method for supplying the necessary heat was presented[10] along with a process for decomposing the salted-out ferrous sulfate to recover its acid values. Plants neutralizing and disposing wastes would be interested in another development[11] where lime with a calcium oxide to magnesium oxide ratio of about 96:4 gives best rates of filtration for the neutralized slurry.

A most interesting study of the physical and chemical changes accompanying mechanical polishing of metals was made last year.[12] It showed the relationship between the phenomenon of friction and the properties of a polished surface. The abrasives are primarily substances of high melting point, not necessarily of high hardness, which can cause local temperatures to rise sufficiently to produce surface flow of the microscopic surface projections.

In the field of chemical polishing, better known as bright dipping, successful treatment of iron for the first time was reported.[13] Employing a solution of 25 g per liter of oxalic acid crystals, 13 g per liter of hydrogen peroxide and 0.1 g per liter of sulfuric acid, bright polished finishes, were produced by immersion for periods up to 1 hr. A passive, rust resisting film was formed

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by this treatment which was about 16 molecules thick.[14]

Chemical polishing of aluminum is now an established procedure but the technical literature has always been a poor source of information on details. Patent holders have felt no inclination to publish any more data than required for patent office requirements. Examination of patents granted during the past year disclosed five new solutions. One of these[15] is noteworthy because of the exceptionally low chemical concentration employed for the dip.

Nickel Plating Research Extended

A research project of the American Electroplaters' Society was responsible for what might well be considered the most important work on the subject of nickel plating in recent years. This project involved an indefinitely detailed study of the effect of plating variables on the structure and properties of electrodeposited nickel.[16] Results indicated that properties of an electrodeposit are determined primarily by the chemical and physical nature of codeposited impurities. Operating variables, except as they influenced this codeposition, had a minor effect on the results.

Another outstanding investigation sponsored by the AES was a study[17] on the effect of iron and zinc on nickel plating solutions. It revealed that iron, in amounts up to 200 ppm, does not appear to decrease the adhesion, brightness, throwing power or salt spray resistance of the deposit. In fact, it improves the last. Precipitation of zinc by raising the pH of nickel baths with nickel carbonate was found to be unsatisfactory as a purification treatment. Low current density electrolysis, which has been standard practice in many plants for years, is recommended for this purpose.

Stresses as low as 2000 psi were obtained[18] on deposits of nickel from a Watts-type solution, employing superimposition of 60-cycle ac. On electroformed radar parts where minimum distortion is necessary, this development may have an important future bearing.

In an investigation of brighteners in acid copper sulfate baths, it was determined that, in the presence of more than the minimum concentration of chloride, use of gelatin as an addition agent results in the formation of cuprous chloride and copper powder at the anode.[19] Results of measurements of specular reflectance also indicate that this determination can be used as a method for control of gelatin or glue brightener concentration.[20]

Two unconventional chromium plating baths employed on a commercial scale were discussed in technical literature. Fluoride-fluosilicate baths were detailed by Hood[21] and the Bornhauser (sodium tetrachromate) solution by Taylor.[22] Both authors compared these solutions, which have wide operating range and high efficiency, with the conventional sulfate-type chromium bath. Fluoride and fluosilicate solutions have attained a degree of popularity in this country, especially for high-speed operations and barrel plating, but equipment corrosion and analytical control problems have mitigated against their wider acceptance.

Another chromium solution described last year was one containing an addition of 38.7 g per liter of indium sulfate.[23] This resulted in production of adherent, bright deposits of chromium which were relatively free from cracks and roughness. Operation was also permissible at lower temperature and higher current density. The addition of the indium salt placing the cost of a chromium bath in the same category as a gold plating solution so that extensive commercial application is extremely doubtful.

Recovery saves materials

On the subject of chromium solution costs, it was shown[24] how air-blowing auto bumpers before and after chromium plating, spray rinsing and concentration of the rinse water for return to the plating solution, reduced chromic acid consumption substantially. Savings were sufficient to pay for the $10,000 installation in 3 months. In addition, the load on the waste treatment plant was reduced.

Very little interest developed in tin plating, but zinc plating was the subject of a number of brightening agent patents and a new procedure[25] of coating uranium, using a predip in Carbitol (ethyl ether of diethylene glycol), was developed.

Patents were obtained on hot galvanizing a flux dam for the pot and a method was found for recovering zinc from skimmings.[26] A new theory[27] was also revealed on the mechanism of formation of the zinc coating during galvanizing.

Deposition of pure iron in continuous strip directly from leached and purified sulfide ore was

"Radioactive tracers helped to prove . . . that sulfidic sulfur atom attaches itself in some form to the silver surface . . ."

patented.[28] It is plated on a rotating cylinder coated with colloidal graphite. Electron diffraction studies[29] emphasized the importance of the effect of plating solution composition on the structure of iron deposits.

In the field of precious metals, radioactive tracers helped answer the old question of whether sulfide brightener codeposits with silver from the conventional cyanide bath. Tagged ammonium thiosulfate brightener with radioactive sulfur[30] proved that the sulfidic sulfur atom attached itself in some from to the silver surface. One new development in gold plating [31] produced heavy deposits (0.010 in.) at about 100 pct cathode efficiency from high concentration cyanide baths containing vanillin and potassium sulfite as addition agents.

Aluminum coatings by electrodeposition have intrigued finishers for a few decades but two processes which were disclosed last year showed promise of producing deposits in thicknesses undreamed of heretofore. Produced only on a laboratory scale, deposits up to 0.20 in. thick were possible from a solution of aluminum chloride and lithium hydroxide in ethyl ether.[32]

In another process, aluminum wave guides were electroformed for the first time to a thickness of 0.040 in. Organo-aluminum plating baths were used under nitrogen atmospheres to eliminate moisture absorption. Superimposed ac and an addition agent to permit obtaining smooth deposits were employed.[33]

A new process in hot-dipped aluminum coatings was developed by General Motors.[34] It employs a molten flux of 37 to 57 pct potassium chloride, 25 to 45 pct sodium chloride, 0.5 to 12 pct aluminum fluoride and 8 to 20 pct cryolite. Steel and cast iron were successfully coated but the deposits were brittle due to formation of iron-aluminum compounds. This formation did not affect the heat resistance of the surface.

Reduction of silver from solution to produce conducting films is the most common method of preparing non-conducting surfaces for plating. It is also used as a finish where the large investment in vacuum equipment is unwarranted. Spraying a solution of silver salt together with a reducing agent from a double-nozzle stainless steel spray gun is standard practice. However, the most efficient operating conditions were determined for the first time.[35]

Use of Vacuum Metallizing and Vapor Coating Growing

High-vacuum metallizing in which evaporated metal is condensed on surfaces in mirror bright form has become the most effective process for production of finishes simulating polished metals, especially gold and silver, at almost negligible cost. This method of producing bright finishes on metal diecastings by lacquering the raw casting to produce the glossy surface, evaporating the metal film and then relacquering for protection, was described.[36] Aluminum is the metal generally employed as the coating and, where colored effects are desired, dyes are mixed with the lacquer for the top coating.

Vapor-phase coatings by decomposition of volatile metal salts, generally halides and carbonyls, on surfaces at high temperature have limited application of the process. Work done in recent years has shown some promise. Typical of the results is the chromium-rich surface on iron and steel produced in the "chromizing" process. A complete survey covered decomposition of metal halides at elevated temperature. It included details on the effects of variation in operating conditions, effects of impurities and the physical properties of the coatings.[37] Patent literature discloses new equipment and methods.

Primers retard corrosion

Sensitizing of anodized aluminum surfaces so that they can be photographically exposed and developed to produce durable reproductions goes back about 20 years. Until last year, there was little activity in this field. Among the new processes published in recent months were modifications of "Seo-Photo," which was the original and rather novel development.[38] It consisted of impregnating the oxide film with blueprint solutions.

In standard anodizing processes, the effect of air agitation in the sulfuric acid bath was investigated.[39] It was found that the temperature of the metal-solution interface was altered to a considerable degree and thus influenced the characteristics of the anodic film. A new method for dyeing anodic films produced in the chromic acid process was also developed.[40] In this method, a lower voltage and slightly higher temperature are employed to produce oxide coatings 0.00015-in. to 0.002 in. thick which absorb dyes more readily.

The oxalic acid process, extensively employed both in Europe and Japan for finishing kitchen utensils, was described.[41] A paper presented on the subject comprised a complete survey of the process, including experimental data. In another extensive work, the sulfamic acid anodizing solution was compared with the sulfuric acid and oxalic acid processes, using ac, dc, and dc with superimposed ac for film production.[42]

Two reports on corrosion prevention of ferrous metals are especially significant. One of these makes a thorough analysis of ship bottom corrosion and also pertains to structural steel

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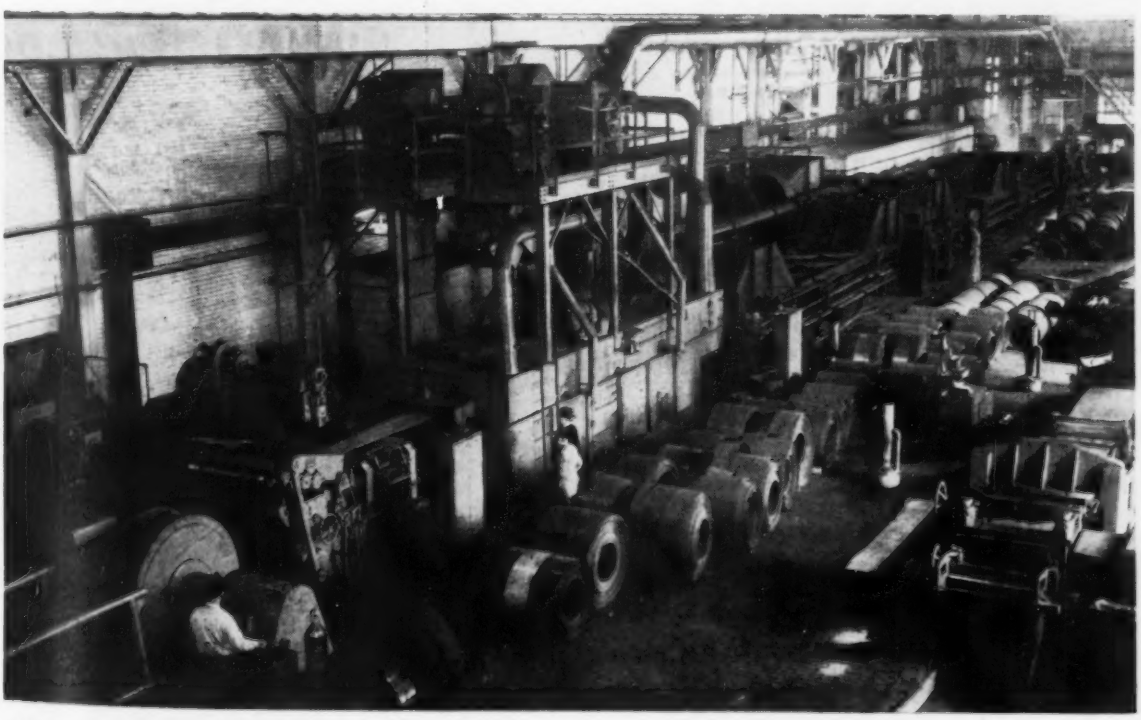
MEASUREMENT OF RADIOACTIVITY. Steel disk, tagged with stearic acid soil, is placed on sample support which slides under window of a tube, inside a lead shield, of the Geiger counting equipment.

shapes.[43] The role of mill scale as a cause of corrosion is more influential than is generally suspected. Weathering, pickling and sand blasting to remove mill scale, followed by painting is the surest way to avoid corrosion. Wash-coat primers of zinc or lead chromate in synthetic resin vehicles, thinned with alcohol and phosphoric acid, seem most effective in preventing paint blistering on descaled steel.

Among mechanical and chemical processes for pretreating steel surfaces, wash primers showed improved performance over other methods.[44] A new standard finishing system, consisting of one-coat wash primer, one-coat vinyl primer and two-coat vinyl-alkyd top coat, is to be released. Tests results indicate that mild rust from which all soluble material has been washed is not a difficult surface to paint. By treating with wash primers containing phosphoric acid, performance outlasted that of cleaning by sandblasting.

Formulation of wash primers was made possible by a highly insoluble basic zinc yellow pigment, known originally as zinc tetroxy chromite. This is dispersed in a solution of polyvinyl



STAINLESS STEEL STRIP PICKLING LINE at West Leechburg plant of Allegheny Ludlum Steel Corp. includes a shot blasting unit. Rate of cleaning varies from 30 fpm for wide material to 75 fpm for narrow material.

"Disposal of waste is a serious matter . . . Ion exchange methods remove undesirable metals . . ."

butyryl resin and, for application, is thinned with phosphoric acid and alcohols. It is applied to a thickness of only 0.0002 in. by brush, dip or spray and acts as a chemical pretreatment rather than a paint primer. This justifies its inclusion in the same category with phosphate and chromate coatings.

Radiactive tracers helped determine the mechanism of phosphating. Employing radioactive iron, the iron from the treating solution becomes an integral part of the phosphate film.[45] There is also chemical absorption of dichromate in the final phosphating rinse on or in combination with the phosphate film.[46] Radiometric evaluation of the effectiveness of this rinse indicates an advantage in using a mixture of equal parts of chromic and phosphoric acids rather than chromic acid alone.

In tests on chromated cadmium, temperature and time were varied to determine that higher operating temperature favors harder film formation and brighter deposits of cadmium.[47]

Disposal of plating room wastes is rapidly becoming a serious matter to the metal finisher. Ion exchange methods not only provided a means for removing undesirable metals from wastes, but for their economical recovery for return to the processing baths. Cyanide, the important offender, has been treated both by decomposition with acid and more commonly by oxidation with chlorine. Treatment time and chemical cost can be reduced if suspended solids are eliminated from the waste prior to alkaline chlorination.[48]

In other developments, an improvement was disclosed in the fused dichromate method of coloring stainless steel black.[49] Instead of immersing in the fused bath, coating the metal with a mixture of sodium and potassium dichromate is followed by furnacing at 320° to 500°C for from 2 to 30 min. The unreacted residues are then rinsed off. Obvious advantages are the elimination of the fused dichromate bath and ability to process any parts which will fit into the furnace.

Also of practical significance are the corrosion studies of some individuals.[50] Copper-nickel-chromium-plated zinc-base, aluminum-base and magnesium-base diecastings were submitted to atmospheric exposure at various locations for a 1-year period. On zinc, the protection was proportional to the thickness of deposit, up to 0.0012 in. Comparatively small increases in protective value were obtained by increasing the thickness from 0.00125 to 0.002 in. Protection of a 0.00125-in. deposit on aluminum or magnesium was very inadequate, but was increased tremendously by an additional 0.00075-in. deposit.

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No more shakes—

VIBRATION

Measured, Controlled by New Test Methods

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Flint

◆ In an extensive investigation, the vibration characteristics of major components of Buick cars were isolated, studied and measured . . . Car vibrations were then eliminated or reduced to unobjectionable levels.

◆ Static, dynamic and torsion tests were among those performed . . . Key problem was to unsynchronize frequencies of masses which resonated with each other.

◆ Principles established in the study apply to many fields of engineering.

◆ VIBRATION CONTROL is a problem confronting the designer of almost any mechanical device having moving parts. In a passenger car, the problem is particularly troublesome because: (1) vibration is carried directly to the passenger, (2) noise must be at a minimum, (3) several comparatively large vibrating masses are involved, (4) vibration due to road shock is added to any vibration set up in engine and power train, and (5) if the vibration frequencies of two or more of the vibrating members happen to synchronize, vibration and noise will be intolerable.

This latter condition can be illustrated with a tuning fork. If two tuning forks, having the same frequency, are set apart and one fork is struck causing it to vibrate, the second fork will

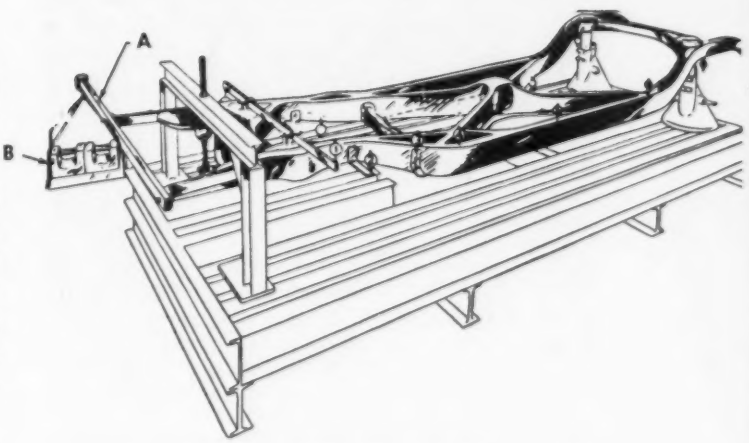

FIG. 1—Static torsional frame test in which frame is held rigidly at rear and flexibly at front. Load is applied by means of bar A and weight B.

"Motor mounts are designed so that frequency of engine does not synchronize with frequency of any other part of car . . ."

also vibrate. This condition must be avoided in automobile construction. Although little attention was given to this problem in designing earlier vehicles, auto engineers recognize it as a major problem today.

The first wagons built had no springs. Likewise, the first so-called horseless carriages had their engines mounted solid with no give or spring between the engine and the rest of the car. As a result, the rider received rough treatment from the road as well as vibration set up by the engine.

The first step to reduce road roughness was the use of a spring between the road and the passenger. Engine roughness was eliminated by using rubber mounts to dampen out engine vibration. The approach in both cases is the same—the frequency approach.

After the frequency stage was reached, most work on automobile motor mounts was temporarily stopped but investigations of the riding quality of cars was vigorously continued. This led to an investigation of the damping phases of the problem. Early investigations showed that as the frequency became lower, the amplitude became larger and, at resonance, unless some form of damping was used, vibration was uncontrollable. This led to the development of the shock absorber to control the amplitude of the ride.

New approach was needed

With the introduction of synthetic rubber of the high hysteresis type, a practical method of damping the amplitude of engine motion became available. However, to employ the new materials with maximum efficiency, it was necessary to develop methods for isolating and measuring vibration.

Many automobile firms had developed a variety of static laboratory tests for automobiles, but up to this time there was no way of reconciling road tests on experimental cars with laboratory strength tests. Cars apparently rigid when tested statically, sometimes had the characteristics of a "bowl of jelly" on the highway. Cars that passed all laboratory static tests, failed because of objectionable shake on the road.

According to Buick engineers, a new approach to the problem was necessary. To develop the necessary data, methods were devised to measure both the static and dynamic tests of a passenger car.

In testing for torsional strength, Fig. 1, the car frame is held rigidly at the rear seat springs and flexibility at the front end by means of a chain on the centerline of the frame. Torsional load is applied by means of bar "A" and weight "B." Deflections are recorded at various points along both sides of the frame. Similar tests have been devised for measuring beam deflection and side deflection.

Static tests of the major components of the car were made: (1) With the frame alone; (2) frame and body combined, (3) frame, body and engine, and (4) the complete car. It was learned from these tests that a sedan body contributes the major share of overall strength to the car. Motor mounts have little effect, but the location of body shims have a marked effect.

Components tested individually

Vibrational or dynamic tests by Buick engineers have been somewhat unique in the automobile industry. After attempting to excite the car vibrationally by running it on rolls equipped with bumps, they decided that the only satisfactory approach was to break the car components down individually and measure the effects of controlled vibration tests.

A vibrator, Fig. 2, consisting of two flyweights geared to produce opposite rotation and a straight-line force was devised. It is driven by a variable speed motor and V belt. The unit can be attached to almost any part of the car—engine, frame, torque tube or rear axle.

Simultaneously, extensive research was conducted on simple spring and weight systems to prove existing spring formulas and to help recognize various forms of vibration in a car. Typical of this method was an investigation of the two-spring, two-weight system represented by the rear axle of the car. Calculated frequencies and actual measured frequencies are remarkably close.

Unsynchronized frequencies reduce shake

Extensive frequency studies showed that in the experimental cars tested, certain masses did resonate with each other to produce objectionable shake. The problem was: how to unsynchronize the frequencies of these various masses.

Key to the vibration problem in a motor car is the motor mounts. These were investigated first and, as a result, all Buick cars are now equipped with motor mounts designed so that the frequency of the engine in any plane of vibration does not synchronize with the frequency of any other part of the car.

The present mounts were designed after investigating both solid steel mounts with varying rates and various kinds of rubber. To illustrate the range of the materials tested, one rubber mount permitted a static deflection of 2 in.

Observations were also made of the effect of

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changing the location of the mounts. From laboratory data and road tests, it was eventually possible to calculate (1) the desired frequency and (2) location and rate of the mounts necessary for the desired results.

Tests show that a 45-durometer rubber on a 50-durometer GR-S synthetic rubber give good results in the manufacturing plant as well as in owner use. Other investigations show that (1) knowing the location and weight to be carried, the surface area necessary to support a given load is easily determined and (2) knowing the desired frequency, the kind of rubber to be used and the weight to be supported, the thickness of the rubber can be calculated.

During the investigation, engineers devised a mechanical stroker, Fig. 3. The motor under test is located on bracket "B" bolted to plate "C." Movement of the mount is either shear or compressive. Tension loading is through the reciprocating rod "D" by means of the crank "E." Motor "F" drives the machine. Loads are measured by SR-4 strain gages cemented to a load-recording tube "G." The corresponding stroke is obtained by strain gages on stroke recording tube "H."

Elevated temperature work is also conducted with this equipment, using an asbestos-lined box. As oscillograph records the hysteresis loop, Fig. 4, of the signal obtained while testing a motor mount. The area enclosed in the loop represents the work lost or the damping capacity of the rubber being tested. When failure occurs in the mount, the shape of the hysteresis loop changes.

Tests also show that the torque tube drive, which ties the engine mass in with the rear wheels of the car, lowers the cutoff frequency, providing a smoother ride with less shake, vibration and rear wheel hop.

Since clutch chatter is a vibrating force, it is desirable to unsynchronize this frequency with the body-frame-motor frequency. When this is done the car will not be excited by the clutch and a smooth engagement will result.

With controlled frequency motor mounts, the passenger does not experience objectionable "curb idle" engine roughness.

The fundamental law of engine vibration has been well demonstrated by these tests. In principle, the frequency of the engine on its mounts should be less than the frequency to be isolated. In the earlier investigations, the amplitude of the suspended weight does not become less than the stroke of the eccentric until the frequency of the eccentric becomes greater than 1.414 times the resonance frequency of the weight on the spring.

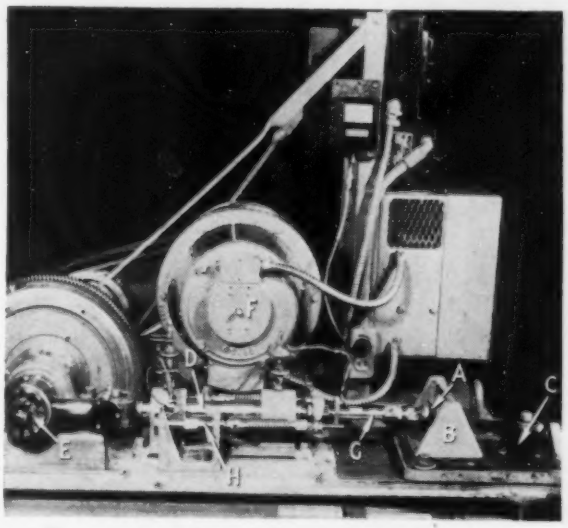

FIG. 3—Mechanical stroker tests damping capacity of rubber for motor mounts. An oscillograph records the hysteresis loop of the signal produced.

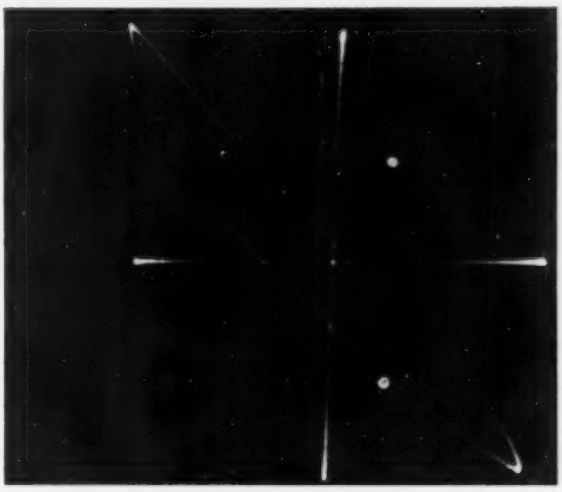

FIG. 4—Enlarged view of hysteresis loop as recorded on an oscillograph. Enclosed area represents work lost or damping capacity of the rubber. Shape of the loop changes when failure occurs in the mount.

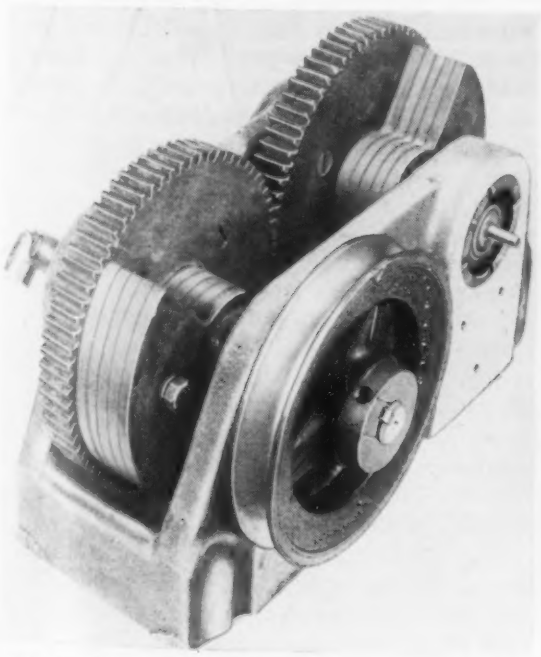

FIG. 2—Vibrator used for testing almost any part of a car. It consists of two flyweights geared for opposite rotation and straight-line force.

For magnetic or nonmagnetic ore—

New Detector Locates TRAMP METAL IN IRON ORE

By W. H. Schwedes
Industrial Engineering Dept.

and

C. W. Clapp
General Engineering Laboratory
General Electric Co.
Schenectady

◆ Difference in structure between tramp metal and ore, regardless of their magnetic properties, can be distinguished by a new tramp metal detector . . . Principle is used for first time.

◆ The first such detector, installed in 1950, protected an expensive ore crusher at a taconite concentrator on the Mesabi Range . . . It located an average of six pieces of damaging tramp per month.

◆ Prevention of a single shutdown con easily return the initial investment.

◆ LAKE SUPERIOR IRON ORES have been the primary source of iron for lower lake port and Pittsburgh area furnaces. Until recently they require no work on them other than extraction and transport. Development of low-grade ores as a major source of iron, on the other hand, is essentially a work process. After extraction and before transport the ore must be crushed, ground, and the iron separated from the mother rock.

A tremendous new capital investment in heavy-duty work machinery presents some new problems to the iron mining industry. One of these is the protection of that machinery from its own broken parts and other tramp metal. Lost or broken drill bits, shovel dipper teeth, rail pieces, fragments of crusher lining will wreck crushers and conveyors which are very costly pieces of equipment.

Removal of tramp metal is a real requirement, but the big problem is that the metal must first be detected. Tramp metal is frequently hidden in ore moving at a high rate of speed in continuous flow through the machinery of the concentration plant. It may be magnetic tramp, but the ore is also magnetic, or it may be nonmagnetic tramp. Its detection, therefore, is a real challenge.

Detection of tramp metal in the presence of nonmagnetic ore has been accomplished successfully by a number of methods: (1) suspended magnets, (2) magnetic pulleys, (3) use of exploring coils to detect the disturbance produced in a steady magnetic field by the tramp piece. Similarly, exploring coils in an alternating magnetic field have been used to detect metallic, nonmagnetic tramp in nonmagnetic ore. In every case, the solution of the tramp metal problem has been obtained only for nonmagnetic ores.

Since iron ore is essentially magnetic, existing techniques could not be used because both the ore and the tramp metal in passnig through detecting apparatus produced similar indistinguishable signals.

Other properties of the ore and tramp metal must be utilized to discriminate successfully between the two. Low-grade iron ore is not a homogeneous metallic solid, as are pieces of tramp metal, either magnetic or nonmagnetic. This difference in structure has now, for the first time, been successfully used to distinguish the tramp metal from the ore, irrespective of their magnetic properties.

Machinery in an ore concentrating plant must be protected by the detection of tramp metal at appropriate points in the ore flow ahead of that machinery and convenient for removal of that tramp. The first installation was designed for use on a conveyer belt ahead of a crusher. An inspection aperture surrounding the loaded belt was established by a set of coils above and below the belt. Coils were designed to permit mounting without cutting the belt.

The coils are cable connected to a conveniently located wall mounted cabinet. This cabinet contains the necessary electronic and control equipment to provide three requisite functions: (1) a stable source of high-frequency power to energize the inspection field, (2) a detection system to discriminate between the energy absorbed by the

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tramp metal and that absorbed by the ore, and (3) suitable alarm devices to signal the presence of a tramp piece.

The alarm devices serve to initiate any means the user may provide for visual or audible alarm, or for marking, or rejecting the section of ore in which tramp metal exists. Automatic counters are provided to record the occurrence of tramp metal.

The first tramp metal detector of this advanced design was installed in 1950 at a pilot taconite concentrator on the Mesabi Range in northern Minnesota. Its purpose was to protect the secondary ore crusher from tramp pieces too large to pass through its discharge opening without damage. These pieces were equivalent to a 1½-in. sphere of metal. The pieces could occur anywhere in the ore section on the 36-in. feeder belt, with a maximum ore depth of 7½ in. The experimental nature of the pilot plant made it desirable to sound an alarm when tramp metal was detected. The inspection point was located about 50-ft from the discharge end of the belt to allow its cleaning when an alarm sounded.

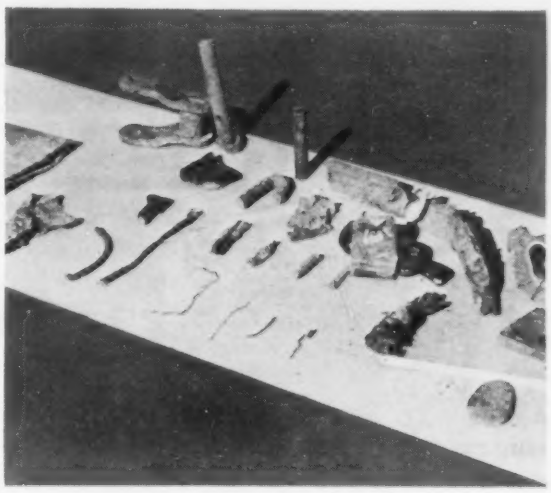
Inspection coils were mounted on rigid, nonmetallic supports and were protected from flying pieces of ore with rubber belting guards. Shock mounting was not necessary. Coils were spaced at least 12 in. from the nearest conveyer idler to avoid adjacent moving masses of metal. For this same reason, the conveyer belt should not employ metallic splicing.

Severe electromagnetic disturbances in the vicinity of the inspection coils should be avoided. Welding circuits using adjacent building structural members as a return conductor were a frequent source of false alarms but have been eliminated.

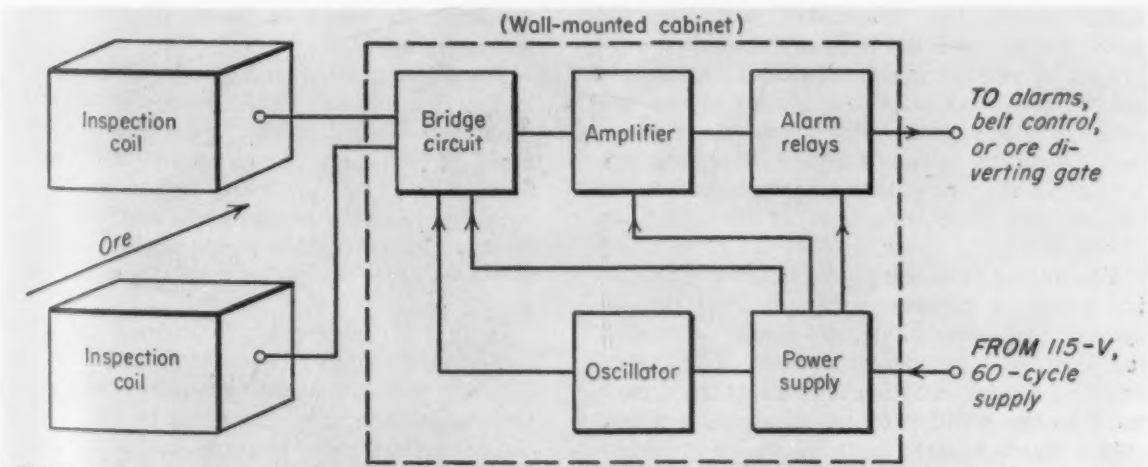
The new detector has been completely successful in protecting its crusher against tramp metal. It has located an average of three tramp pieces per day of which an average of six pieces per month were of damaging size.

Frequent occurrence of tramp in this installation is surprising in that the ore is taken from small fresh pits and the operation is under carefully controlled conditions requiring full accountability for broken machine parts. In full scale operation, this control would be less effective and the percentage of dangerous tramp to ore would probably be higher.

This new tramp metal detector has proven successful in inspecting the low-grade magnetic taconites found on the Mesabi Range. Its principal field of application is for inspection of this type of ore. Certain intermediate grades of iron ore can also be successfully inspected depending on their magnetic iron content and on such factors as the size ratio between the damaging tramp piece and the largest ore piece passing through the inspection aperture, cross section of the ore stream through the aperture, and cost of removing tramp from ore after detection.



ASSORTMENT OF TRAMP PIECES removed from low-grade magnetic taconite ore from the Mesabi Range. Pieces too large to pass the discharge opening of an ore crusher can cause serious and costly damage to equipment.



TRAMP METAL DETECTOR SYSTEM performs three essential functions: (1) Provides a high-frequency power source for the inspection field, (2) Discriminates between energy absorbed by tramp metal and ore and (3) Alerts a signal at the presence of a tramp piece. Detecting tramp metal really challenges the laws of physics.

Flexibility a must—

Multi-Spindle Automatics BOOST Short Run Production

◆ Production of 1500 types of products puts a premium on flexibility in any manufacturing organization.

◆ To efficiently handle an ever-changing pattern of short and medium run work this company resurveyed process and control relationships... Addition of a few versatile machines in the turning department permitted handling many difficult jobs faster and at less cost.

By J. P. Bank
Works Mgr.
Independent Pneumatic Tool Co.
Aurora, Ill.

◆ AIR AND ELECTRICALLY powered tools, ranging from large pneumatic tools to small electric drills are made mostly on short and medium runs. The ability to handle this type of production efficiently is further complicated by a changing pattern of demand for different lines brought about by business fluctuations.

Mere added capacity is no basic solution to this type of production problem common to many plants among the "non-mass" producers. To solve the problem, the company embarked on a project of resurveying fundamental process and control relationships. Three phases of the program have been particularly successful in boosting the ability to handle an ever-changing pattern of short and medium quantity work. A few of the 1500 Thor tools built at the plant are shown in Fig. 1.

The first of these entailed a method of shrinking inventory turnover to the shortest possible cycle to make most of plant capacity by matching it directly to current orders. The second required a reorganization of the turning department by the addition of comparatively few machines whose modern features enable a variety of tough jobs faster and cheaper. The third innovation involved the setting up of an investment casting department for the most complex parts, thus relieving the non-turning departments, milling, drilling, boring, etc., of these difficult jobs.

The maximum-minimum inventory system formerly used in the plant was replaced by a new production control program keyed to complete inventory turnover every 90 days. The system relies on an IBM analysis of families of parts to effect the necessary combination of like and similar parts. A manufacturing schedule which would involve 3300 shop orders if sent through "raw" is able to be condensed to only 300 orders. Information from the sales department reflecting sales forecasts is used in making up production schedules.

Reorganization of the turning department keystone of the plant's production was the most vital part of the program.

While facilities in the basic turning departments were substantial, equipment lacked the necessary flexibility to handle varying production adequately.

The high production capacity of a bank of eight conventional multiple-spindle machines could only be utilized for large quantity work. Much of the time of the group of 60-spindle machines was tied up in frequent setup changes. And, due to close tolerances and tough-work materials, 16 turret lathes were loaded with second and even third operation work from the automatics.

In 1947 it was decided to augment the above equipment by adding two new Warner & Swasey 5-spindle bar automatics to test out the productive capacity of these machines in the light of their simplified setup features. Initial experience led to the addition of five more of these machines three years later, Fig. 2.

The new multiple-spindle automatics proved capable of taking over the marginal jobs from

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either single or conventional multiple-spindle automatics, resulting in a much improved balance of work. Due to built-in mechanisms for easy stroke and feed changes, the 5-spindle automatics can work profitably on lots as small as several hundred pieces. Where the planning system called for a sequence of similar jobs, setup changeovers run about an hr, making it possible to handle even 100-piece runs in cascaded work. While a complete change of setup may run as long as 5 or 6 hr on these machines, the average for all jobs only takes 3.5 hr. Since no cams have to be prepared, the machines are always ready to tackle any sort of new work.

The twelve work positions and the ability to repeat accurate settings permit the consolidation on these machines of as many as four different operations formerly spread over single spindles, turret and engine lathes and even thread millers. In addition to the turning time saved, combining these operations has minimized intricate scheduling, handling between operations, and shortened overall processing time.

Increased output has been achieved without a corresponding demand on skilled workers. Simplicity of setup and sustained accuracy have reduced attention time on the job, making it easy to train new operators. When lot sizes reach 650 pieces a single operator can take care of setup, tool grinding, adjustment and actual operation of two machines. On 1000-piece runs, one man can readily handle the same parts on three machines.

The reduction gear blanks shown at C in Fig. 3 illustrate how these factors work out in actual practice. A large variety of these gears are required, varying from one to another in pitch diameters and shaft-end detail. Lot sizes vary for 150 to 1500 pieces, material is 8640 steel.

Previously two single-spindle machines ran continuously on these blanks, followed by secondary turret lathe operations. Now, although five times as many gears are being turned out as was the case 10 years ago, one Warner & Swasey takes care of complete machining in the equivalent of 4 days per week.

Since as many as four form tools can be used

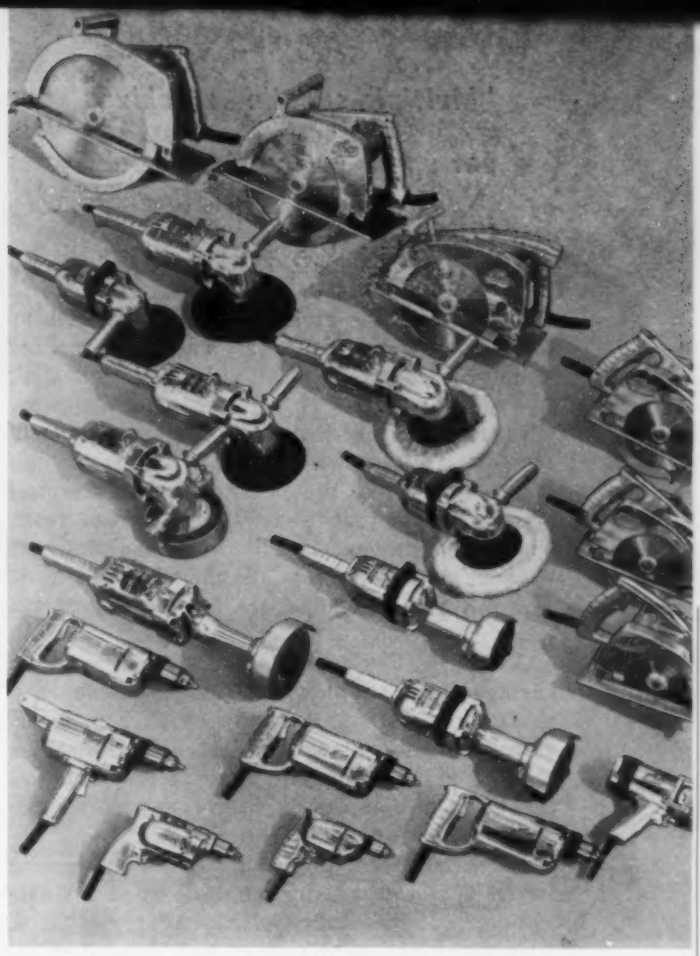

FIG. 1—Production of some 1500 Thor tools, a few of which are shown here, requires adjusting machinery and processes to economical production for limited and varying requirements.

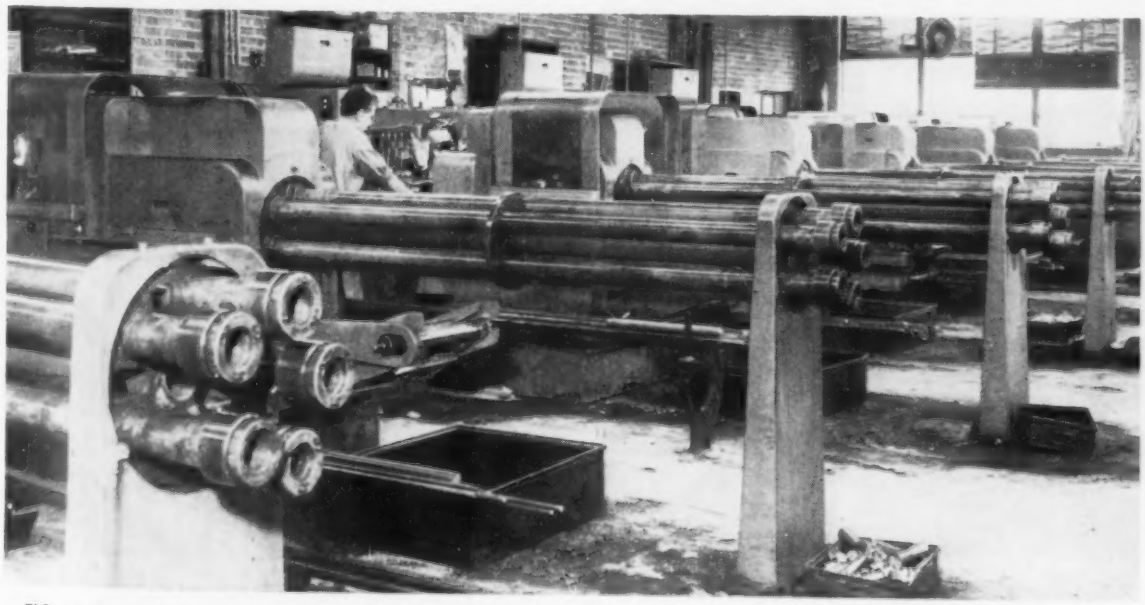

FIG. 2—Seven Warner & Swasey 5-spindle automatics have taken over marginal jobs from either single or conventional multiple-spindle automatics resulting in a much improved balance of work.

"Multiple-spindle machines are set up to run various gear types in sequence . . ."

on this work, the multiple spindles are set up to run the various gear types in sequence, making it only necessary to reset calibrated slide dials in order to switch to different gear diameters without resetting tools. Tooling arrangement for this job is shown in Fig. 4. The form tools are chosen so that the cutter that does the most work is the one that is easiest to grind and reset. Various bearing ends are likewise handled simply by changing knee tools. Savings on this class of work have already paid for several of the new machines.

A saving of better than four to one has been chalked up on another group of parts, the drive shaft impact spindles, shown at B, Fig. 3, assigned to the 5-spindle machines. Here machine rigidity is an important factor as the parts are turned from a super-tough rivet set alloy especially made for Thor.

Previously these impact spindles were formed in two operations, being roughed out on a single spindle and straddled to length on a turret lathe. Both machines were run at half normal speed on this work due to the tough alloy.

Now these parts are finished for grinding in a single multiple-spindle operation at full speed shown in Fig. 5. On other similar-stepped spindles and armature shafts, these machines reduce to one operation what formerly took as many as four.

Another part, a thin-walled protection nut turned from 2⅛-in. bars also demonstrates its ability to combine operations at a high-removal rate. These nuts were formerly rough turned in one operation, the relief cut made in a second, and Class 3 threads hobbed in a third. Cost of this last step alone ran to 20¢ per part. Now the complete part is finished in one operation in 132 sec.

The machines are capable of Class 4 threads, as shown in the reducer bushing, D in Fig. 3. These threads were formerly milled, following rough forming of the part on a single spindle. The part is now completed on a 5-spindle in 27 sec, at a cost reduction of 8.5 to 1.

Use of these machines proves out equally well on longer run work. The lock collar shown at A in Fig. 3 is run in quantities of 20,000 to 30,000 pieces, and was formerly assigned to 4-spindle machines. Now run on a 5-spindle automatic, the 75-sec cycle has been cut to 27 sec.

The new units also compete on simple work. Plain 0.05-in. diam washers were formerly run on single spindles in a 15 to 20-sec cycle. Now they are produced on the multiple spindles in 7 sec with a single cut-off and in 3.5 sec if quantities justify setting two tools.

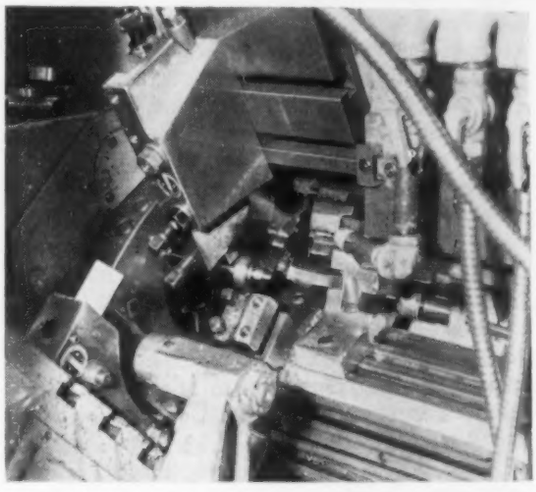

FIG. 4—Various reduction gear blanks are produced in lots from 150 to 1500 pieces. Tooling arrangement for gear blanks, C, Fig. 3 is shown here.

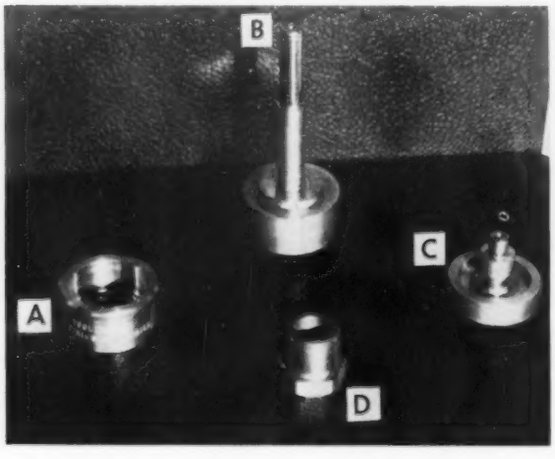

FIG. 3—Parts formerly made in as many as four operations on a number of machines are now made in one operation on a single machine.

FIG. 5—Operator checks dimensions of drive shaft impact spindles. Previously they were formed in two operations on two machines.

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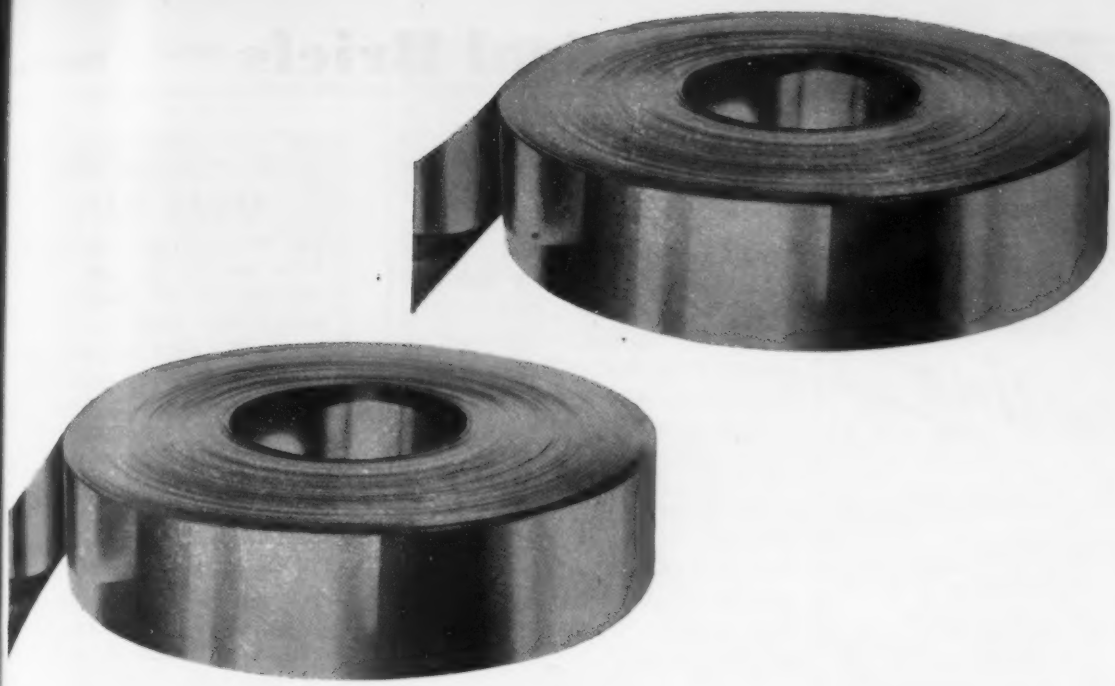

Look alikes don't always cost alike

Two coils of cold rolled steel, side by side, may appear to be identical. The analysis may be the same, the coils of equal weight, both labeled "strip" and both available for immediate usage. One may carry a price tag somewhat less than the other —what if it is a sheet mill product slit to a strip width? Well, if sheet-mill tolerances and finish will produce your end product satisfactorily that's the choice for you because sheet-mill products should cost less than strip. But if you are more interested in end-product cost than first-steel cost, you may be one of those who find that CMP Thinsteel is worth the difference.

CMP strip products in intricate or costly assemblies mean fewer final rejections and thus reduce labor costs. In many applications steel is a relatively unimportant item of cost when measured against labor and fabricating costs. If you can count on the steel being *just right* — as to gauge tolerance, finish, structure, and temper, you insure yourself against troubles outside your own control. In the last analysis you get what you pay for. If you want the best you'll check on the built-in values in CMP strip steel products.

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Technical Briefs

CAM ACTION DIES:

Stainless steel duct ends press-formed at Northrup.

Development of cam action punch press dies to form stainless steel duct ends has saved an estimated $1 million in production costs, Northrop Aircraft, Inc., Hawthorne, Calif. reports. The ports are used on hot air ducts in the Scorpion F-89.

Rings are made of types 321 and 347 stainless steel and vary from 1 to 5¼ in. in diam. Because they had to be fabricated to extremely close tolerances, they were machined from heavy wall tubing.

Replaces Machining

Use of punch press forming in lieu of machining has cut fabrication time from up to 3 hr to less than 5 min per part.

For joining hot air ducts, Northrup uses a selfsealing, molded silastic seal. This seal is backed up by a metal clamp, which confines the seal and holds the ducts together by clamping over flanges on the duct ends.

Concentricity Important

The flanged duct ends had to be held to a 0.010 in. diam and 0.005 in. concentricity tolerance to assure a perfect seal. The cam action dies form these parts in a punch press from 0.035 in. wall tubing up to 2 in. diam, and from 0.035 in strip stock welded into sleeves up to 5.25 in. diam.

Strip stock is rolled into a sleeve, and Heliarc-welded on a steel mandrel. A copper insert prevents the weld from sticking to the mandrel.

Forming Characteristics

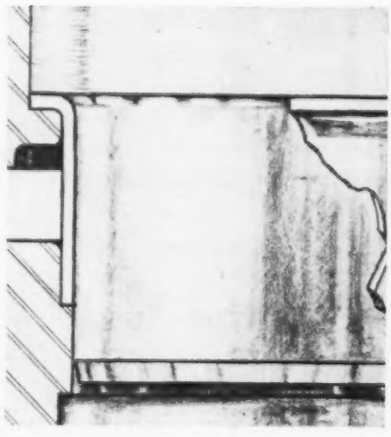
Prior to designing the forming dies, tests were made to determine the forming characteristics of the sleeves. By using a punch with an 0.090 in. radius for the sleeve to form against, a flange was easily formed. The flange, however, will continue in an arc forming a grommet unless it is restricted.

Punches are provided for each different sleeve wall thickness in order to maintain a minimum cavity between the punch and die to assure a flat flange and prevent wrinkling the sleeve.

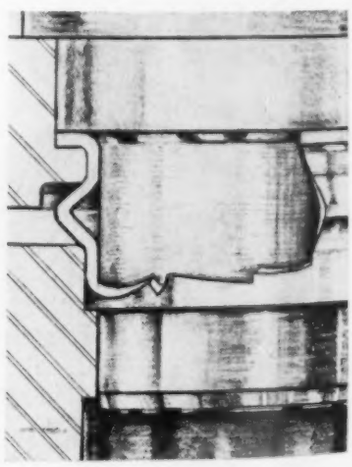
Each set of dies was developed

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 99. Just indicate the subject heading and the page on which it appears. Be sure to note exactly the information wanted.



FLANGE FORMS FIRST because more pressure is needed to buckle tube into bead than to turn the flange. Here top end of sleeve has been turned out by radius of flanging punch.



TOP FORM DIES and punch continue downward and are buckling the sleeve outwardly in the unsupported area between the top and the bottom sections of the die.

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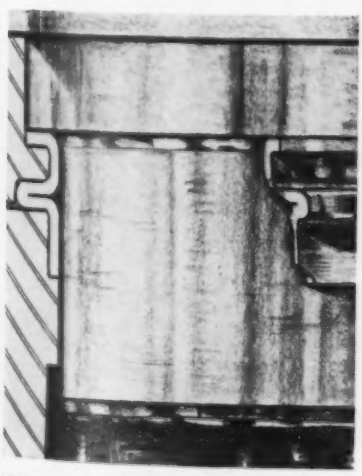
to use the same width sleeves, so that one width of strip stock could be used for all sleeve diameters.

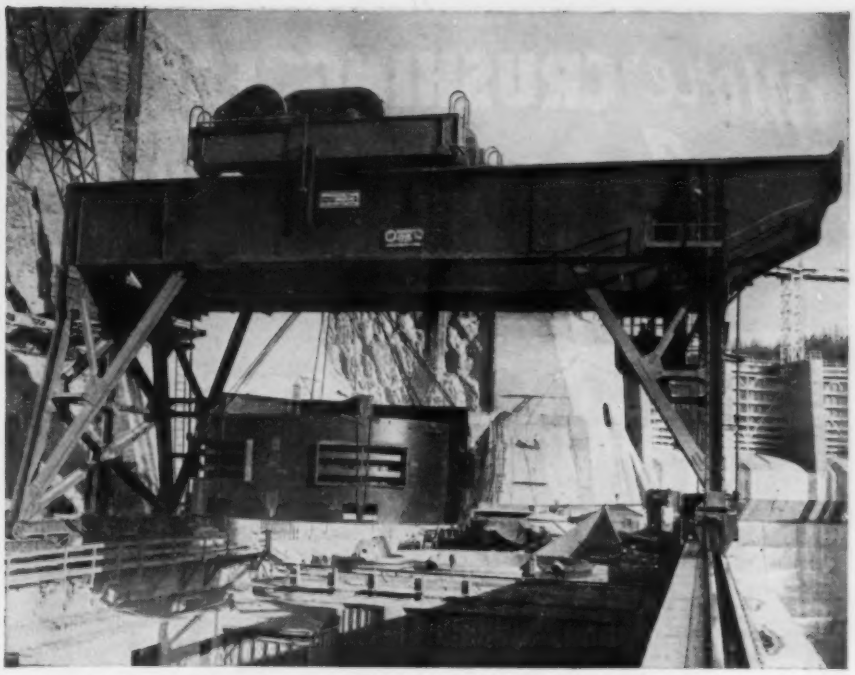
Flange height is 0.130 in. and the upset bead height is 0.180 in. max above the sleeve outside diameter. The upset bead was first formed by using heat on a flash-weld machine, but it was found that heat was not necessary.

Better parts were made when they were worked cold, so the cam action, punch press dies were developed. Although this is an unusually high bead to be formed cold, it is within the elastic range of the material. The Heliarc welds are ductile, and have given no difficulty.

BOTTOM DIES of die set are stationary. Die set is mounted in 6-in. stroke punch press. Top dies, in two segments, are fastened to sliding die holders and spring loaded in open position.



AFTER DIES HAVE BOTTOMED buckle has formed an upset bead into the recess provided in the top form die. Recess restricts maximum height and thickness of bead.



Bedford Gantry Crane, installed by Ebasco Services, Inc., for Washington Water Power Co., Spokane, at their new Cabinet Gorge Hydro-Electric Station near Clark Fork, Idaho. Conservatively rated at 275 tons, crane easily handles massive rotors up to 330 tons.

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—Technical Briefs—

New Water Heater Developed

Inner and outer tanks of a new water heater made at Trageser Copper Works, Inc., Maspeth, N.Y., will be completely of copper. The all-copper unit will be incased in a steel shell for structural strength.

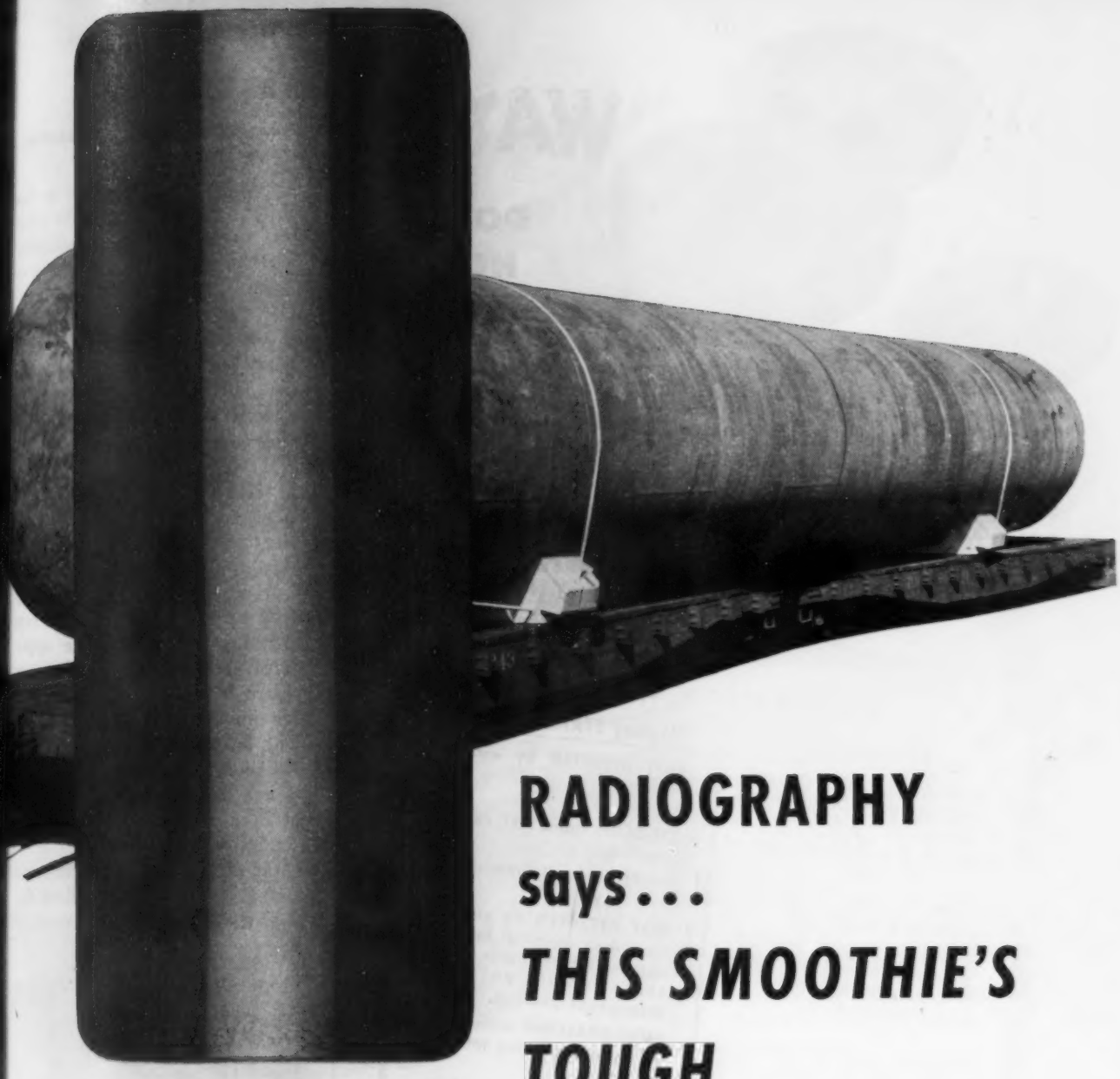
The heater, developed after 4 years of research, will have a rolled copper shell.

ROLLING COPPER SHELL of water heater at Trageser Copper Works. New heater has a built-in flue which prevents heat leaks.

SEAMS of inner copper core of water heater are copper brazed for tightness.

SOLID COPPER CORE of water heater fits snugly into steel casing. Internal flue is also copper.

Turn to Page 150



RADIOGRAPHY says... *THIS SMOOTHIE'S TOUGH*

This 90-ft. pressure vessel looks smooth, clean, and neat. But that's not all that welding did for it. It helped make the tank strong and tough with less weight and at lower cost.

Designers of pressure vessels can take full advantage of the welding process because each weld can be proved sound by radiography.

This is how radiography widens the opportunities for welders—why it can increase your business.

Wouldn't you like to know more about how it can help you? Get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, New York

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Water ruins SAND strainer cores. AlSiMag Strainer Cores are not affected by any amount of water—even a stream of water from a high pressure hose does not affect them!

Consider these other advantages, too!

COMPARISON TABLE

SAND CORES	AlSiMag STRAINER CORES
Disintegrate under rain or prolonged exposure to moisture.	NOT AFFECTED by water.
Must be handled carefully.	STRONG, stand fast, rough handling.
Some variation in size of cores and openings.	UNIFORM in all dimensions.
Eroded to varying degrees by stream of molten metal. Holes frequently enlarged as metal is poured.	NOT AFFECTED by stream of molten metal at normal pouring temperatures. Hole sizes remain uniform throughout pouring.
Eroded sand sometimes carried into casting by molten metal.	NON-SPALLING under normal metal pouring temperatures.
High percentage of breakage.	VIRTUALLY NO BREAKAGE.
Require hand reaming or cleaning of holes.	Clean, accurate, ready to use.

One foundry using 500 strainer cores per shift made a careful check on their costs of making sand cores. They thought their sand cores cost them practically nothing. They found that cost, including breakage, was 3c each.

The original cost of the AlSiMag core was less . . . and they got big dividends in faster handling, better castings, cleaner castings. If you will accurately check your own costs we believe you too will find that AlSiMag cores save you money! *Samples and prices on request.*

AMERICAN LAVA CORPORATION

CHATTANOOGA 5, TENNESSEE

51 ST YEAR OF CERAMIC LEADERSHIP

Technical Briefs

AIR AT WORK:

Use of air power speeds production of small parts.

Application of air power to two production operations at the Atlas Metal Stamping Co., Philadelphia, has helped raise machining production rates.

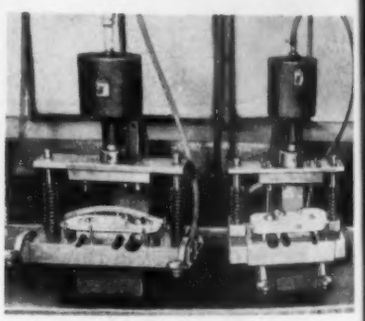
In a balling operation, an effective method of sizing three holes in a gear box and three holes in a cover plate has been developed. In the operation, which uses two Mead air presses, cover plate or gear box are positioned in a jig.

Holes Sized

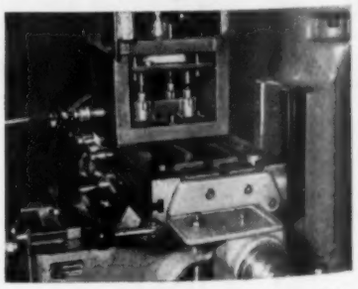
Hardened ball bearings are then placed in the respective holes of the plate or box, and two fingertip valves are tripped. When the ram comes down, pins in the upper half of the fixture force the balls through the holes, bringing the holes up to a true diameter.

The balls drop into slots in the lower part of the fixture, ready for the next cycle. Valves are connected in series. For safety both hands must be used.

In another operation more rapid location of parts in a milling fixture is made possible by use of air cylinders.



HOLE DIAMETERS are brought to size by forcing steel balls through holes in cover plates and gear boxes.



LOCATION of gear box in milling fixture is speeded by using air cylinders.

Turn to Page 152

...with TYCOL lubricants on hand!

Take metal fabrication, for example. There's a Tycol lubricant for any application you can name: For instance, what about tough machining jobs? . . . Tycol Afton cutting oil keeps cutting edges cool . . . lengthens tool life between grinds. Machine tool hydraulic systems? . . . Tycol Aturbrio oxidation and rust inhibited oils keep them running smoothly. Open gears of metal forming equipment? . . . Tycol Amaclac lubricants cling like cat hair on a serge suit. You always get top performance with Tycol lubricants. Why? . . . Because each Tycol grease and oil is manufactured from high quality base stocks and *tailored* for a specific application. Get the full story of the entire Tycol line from your local Tide Water Associated office today!

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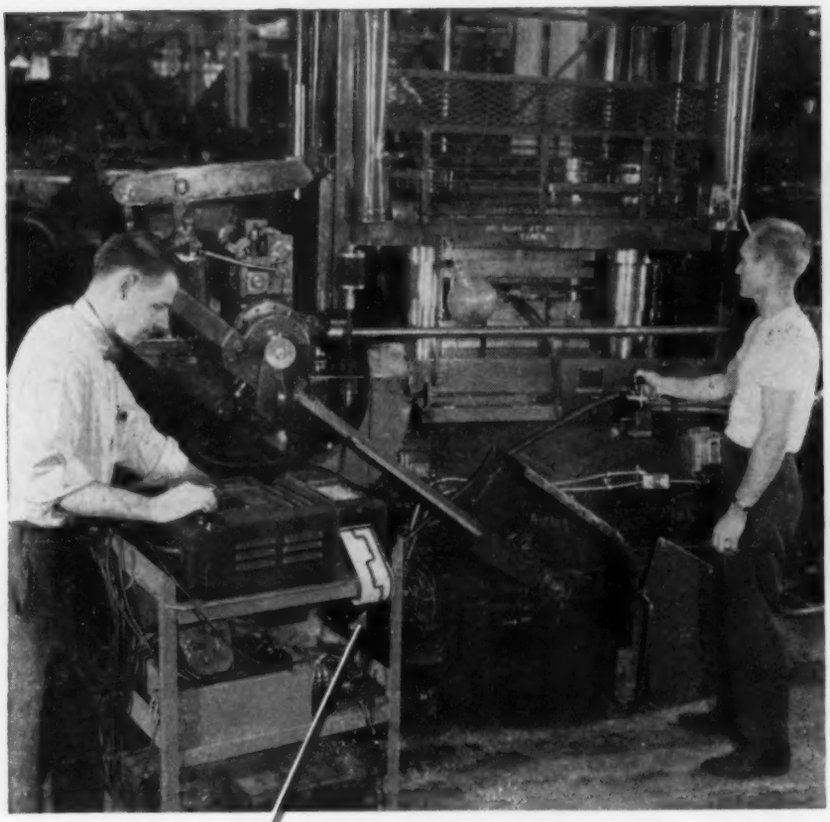

CHECKS PRESS LOADING

with Brush Recording Analyzer

Here, in the plant of a large manufacturer of automotive parts, periodic checks are made on this 150-ton mechanical press to spot possible overloading. With resistance-type strain gages mounted on the press, the signal is amplified and recorded by the Brush Strain Analyzer... producing an *immediate chart record* of press strain.

Since measurements can be made quickly and easily, the Brush Strain Analyzer furnishes a *practical method* of detecting overloading and avoiding costly breakdowns, and lengthening press life.

You can use Brush Recording Analyzers to save time and solve problems... in measurement of strain, torque, vibration, pressure, d-c or a-c voltages or currents, and other variables. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Limited, Toronto. For bulletin write Brush Electronics Company, Dept. CC-2, 3405 Perkins Avenue, Cleveland 14, Ohio.

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—Technical Briefs—

FURNACE COSTS CUT:

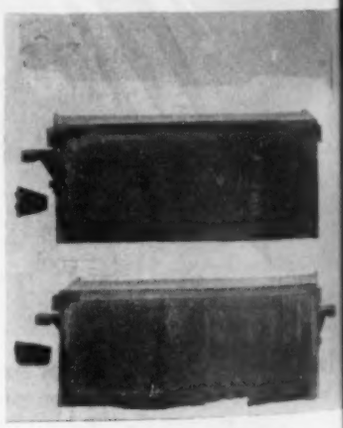
Swing to ductile iron door lowers boom on maintenance costs.

One forge shop has save $25,000 a year by shifting fro gray iron to ductile iron for forg ing furnace doors is indicated b the experiences of a large Ne England manufacturing plant.

Interior temperature of th furnaces in this plant is approx imately 1950° F. The cast door were formerly made of gray iron lined with refractory materia These required replacement or re pair in 6 days because of growth warpage, and scaling.

Tried Them Out— Trial instal lations of similar doors cast i ductile iron by Taylor and Fen Co., Hartford, were made. Thes provided an average life of ove 300 days, or more than forty time that of the cast iron doors.

Plant maintenance men on th basis of this performance estimat that the shop can effect a savin of approximately $25,000 a year b standardizing on ductile iro doors for its 17 furnaces, or al most $1500 a door.



DUCTILE IRON forge furnace doors, top after more than 300 days of service and gray iron doors, bottom, after 6 days ser vice.

Doctors Use Sulfur Isotope

The sulfur isotope, Sulfur 35 has been successfully used to label and trace the thyroid-stimu lating hormone of the anterior pituitary gland, doctors of the Sloan-Kettering Institute, New York, have reported.

Turn to Page 154

WHY DO McKAY MACHINES REQUIRE

Less Maintenance?

McKAY RESISTANCE WELD TUBE MILLS

CUT OFF SYNCHRONIZED WITH MILL SPEED TUBING CLAMPED BOTH SIDES OF CUT

OIL-COOLED COMPLETELY SEALED ROTARY TRANSFORMER NO WATER NEAR HIGH VOLTAGE

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ALLOY GEARS FORCE LUBRICATED NO OVERHUNG GEARS ALL MAIN ROLLS DRIVEN

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Position _____

Company _____

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—Technical Briefs—

CLEANING CASTINGS:

Table-type abrasive cleaning unit handles wide range of parts.

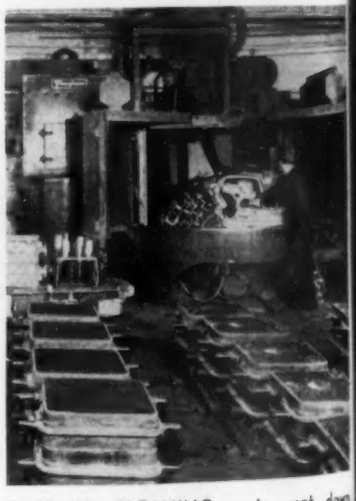
More than 10 tons of bronze castings are cleaned every hour at Jardine Bronze Foundries with no need to turn the castings during cleaning and no transfer of color from the abrasive to the casting.

Jardine, a jobbing foundry in Baldwinsville, N. Y., recently installed a Pangborn 6-ft LK table in its cleaning room to handle nonferrous castings. A number of different sizes and types of castings are produced.

Castings Vary—Jardine makes a large number of castings for defense material. Nickel alloy castings used in milk-bottling machines and many food processing machines are also produced in this foundry. A single piece of cleaning equipment known as a table-room handles almost all cleaning work.

Loading tests have indicated that the table-room can operate efficiently with table loadings of 1500 lb which need only be blasted for four minutes. With careful loadings the castings can be blasted clean without being turned.

Abrasive—The abrasive used in this operation is a 50-50 mixture

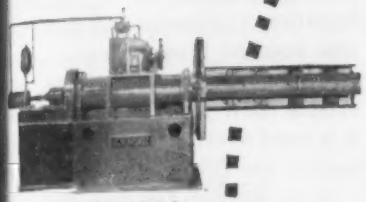


CASTING CLEANING costs went down when this table-type abrasive cleaning unit was installed. Close to 1500 lb of castings have been cleaned in 4 min.

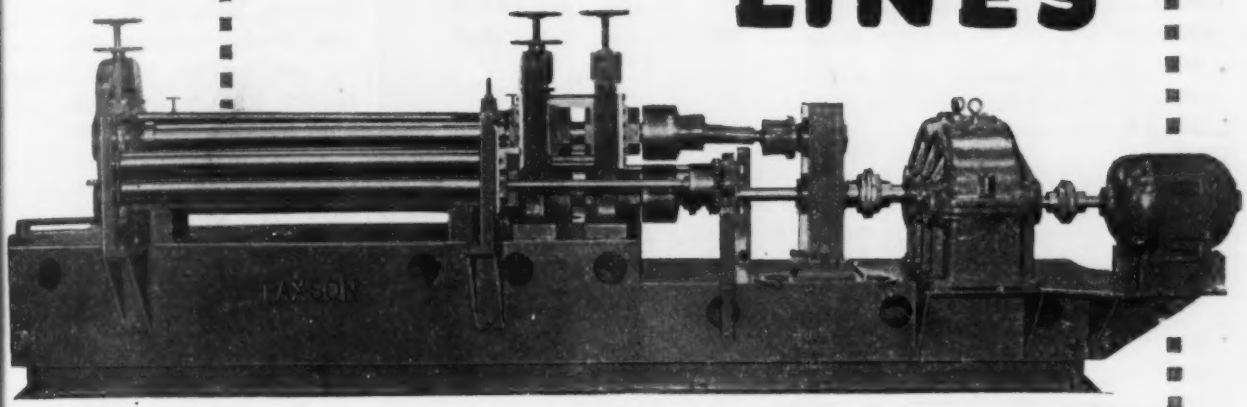
Turn to Page 156

PAXSON GIVES YOU THE EDGE

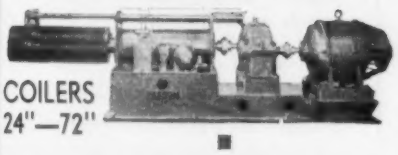
HEAVY-DUTY *Slitting* LINES



PAY-OFF REELS
24"—72"



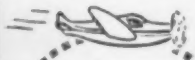
SLITTERS
24"—72"



COILERS
24"—72"

SCRAP WINDERS

ROTARY SCRAP SHEARS



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Paxson Slitters are proving their efficiency for the toughest jobs, such as cutting heavy wall tubing stock and other heavy-duty slitting. Capacities up to 40,000 lb. coils. Various power, to meet requirements up to 1½" total metal thickness. Paxson also builds general duty lines.

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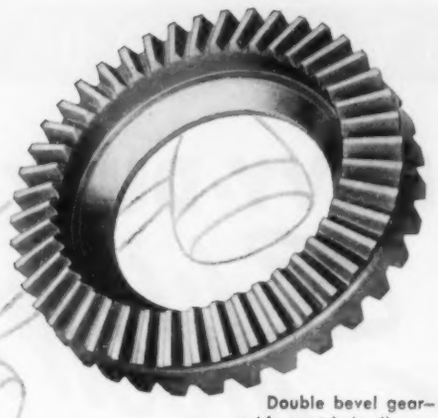

Double bevel gear—used in post hole digger

Spur	Internal
Helical	*Coniflex Bevel
Worm	Spiral Bevel
Herringbone	Spline Shaft

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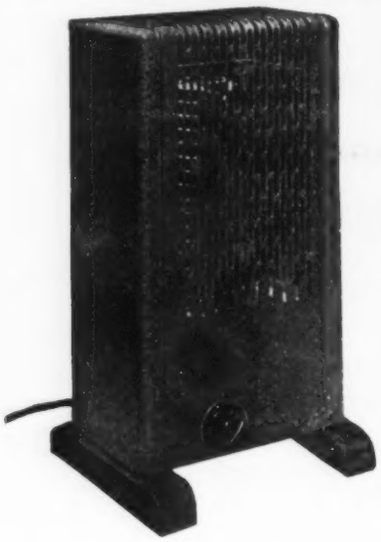

Why not use Perforated Metal?

This Wesix Electric Heater shows a typical application of Hendrick Perforated Metal, combining utility and attractiveness. The heater guard is 20 gauge steel, with 3/16" x 1½" side stagger perforations.

With facilities for producing any required shape and size of perforations in any commercially rolled metal, Hendrick invites inquiries from manufacturers who may be considering the use of perforated metal in connection with any of their products.

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of G-25 Malleabrasive grit and S-170 Malleabrasive shot. This mixture has proved completely satisfactory and Jardine has never had any customer complaints about discoloration of bronze castings. Experience indicates that the abrasive does no transmit color to the castings, but rather picks up bronze color from the castings. As it is used over and over, it does not darken the bronze.

Most of the castings made at Jardine are regular bronze, 85 pct Cu, 5 pct Sn, 5 pct Pb, 5 pct Zn. However, large quantities of nickel alloy bronze castings, about 20 pct Ni and bearing bronze castings, higher lead content, and aluminum castings are produced.

Since the installation of the new table blasting equipment, figures have been kept on cleaning room operations, and they indicate that a 30 pct saving in grinding operations has been made possible because of the efficiency of the blast cleaning job.

LAPPING:

Splines on precision instrument parts easily lapped.

Internal and non-rolling external splines for precision aircraft instrument parts where heat treatment distortions are a problem can be lapped on a production basis by a method developed by Michigan Tool Co., Detroit.

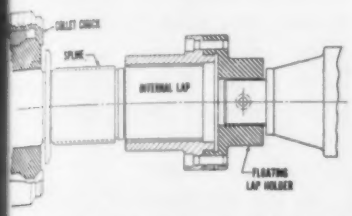
The method for lapping small splines permits production lapping of external splines of insufficient depth to allow continuous rolling contact with a lap in conventional external lapping machines. Production lapping of internal splines so small it is impractical to make a lap that will roll with the spline, is also possible.

Work Drives Lap

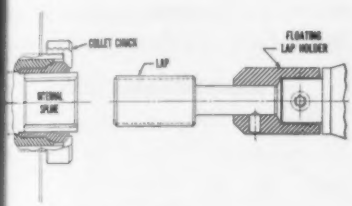
For lapping external splines, parts are chucked in an internal lapping machine. An internal toothed lap having the same number of teeth as the spline is mounted in a floating holder on the re-

iprocating lap spindle. The lap is ade with sufficient clearance to lide over the spline.

In operation, the work drives the ap and the lap spindle recipro- ates on the work centerline while he work and lap rotate together. The lap spindle is braked hydrau- ically to give lapping action to



EXTERNAL SPLINES are chucked in an in- ernal lapping machine. Internal toothed ap is mounted in a floating holder.



NTERNAL SPLINE members as small as 1-in. pitch diam can be lapped.

one side of the splines. The work is rotated in the opposite direction to lap the opposite side of the splines.

For lapping internal splines, a similar arrangement is used with the internal splined member in the chuck and the external splined member mounted on the lap spin- dle with a floating holder. Splines as small as 1-in. pitch diam can be lapped by this method.

Small Solder Jobs Simplified

A low melting point paste solder which can be applied with a brush, plus the heat of a cigarette lighter has simplified many small soldering jobs, according to Eutectic Weld- ing Alloys Corp., Flushing, N. Y.

The Eutec-TinWeld has extreme- ly thin flowing properties. Solder is carefully balanced with flux so that high wettability and capillary action permit penetration of the tightest of joints.

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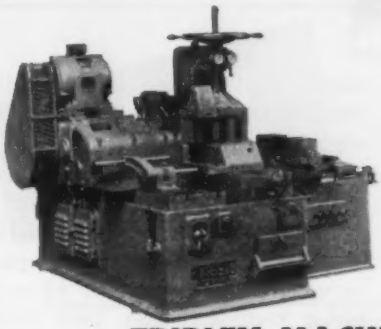

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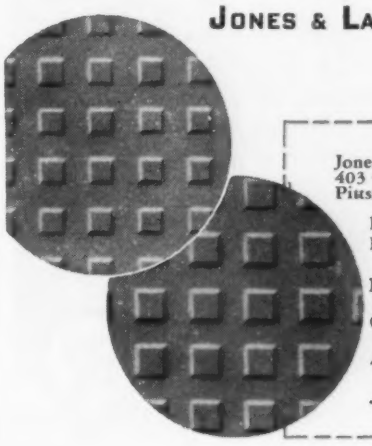

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CREEP TESTING:

Record 3-year high temperature creep data on nickel alloys.

High temperature creep characteristics of nickel alloys, an important performance measure of materials for jet engines, high temperature steam turbines, and for meeting ASME Boiler Code Specifications, are being determined continuously by a leading maker of nigh strengtn and corrosion resistant alloys.

More than 40 creep machines apply loads ranging from 2800 to 100,000 psi at temperatures of 700° to 1800°F. Stresses and temperatures are held constant by automatic controls. Test time varies from 100 hr or less to 3 years or more. Longest test has been running 3 years at 2800 psi and a 1000°F.

Short Duration Tests

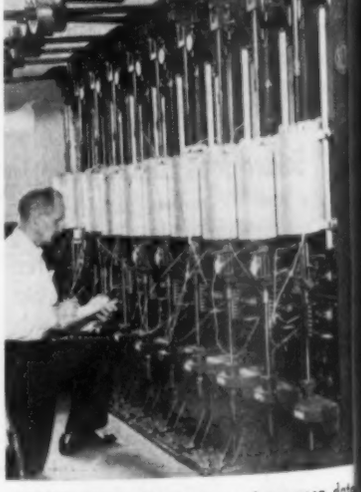
One of the most common test is the acceptance test for high strength alloys to be used at high temperature. These tests are usually of short duration and are intended as an assurance that the material meets specifications. Materials that meet the ASME Boiler Code specifications must usually have a life of at least 20 years. Creep tests at lower temperatures and stresses are therefore correspondingly longer

In the development of new materials to withstand still higher temperatures and stresses, creep performance is determined by a series of tests at different temperatures and stresses, and are plotted in a family of stress-rupture waves.

Counterweights Added

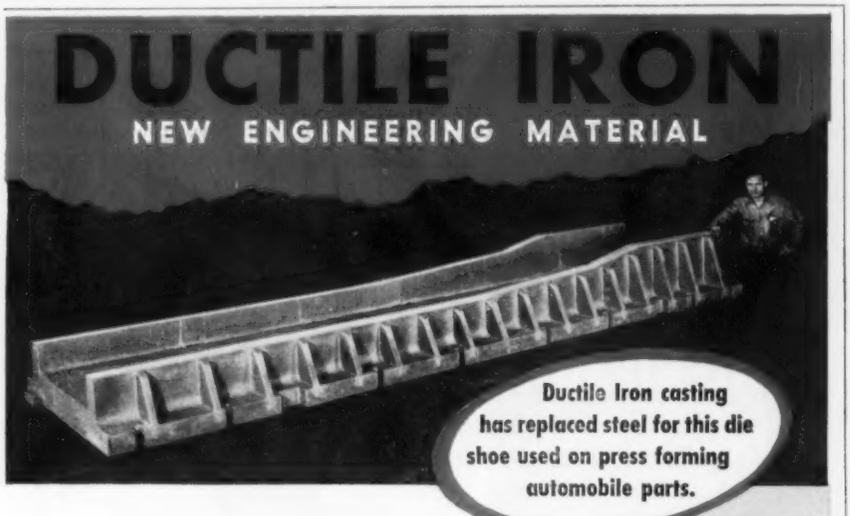
Newest creep machines used by International Nickel Co. for these tests are 34 Baldwin lever type machines of 12,000-lb capacity and one Baldwin screw type machine. Ten of lever type machines have been modified by counterweights to balance the weight of the lever system.

Another added accessory is shock-absorbing dashpots under the loading weights of several machines. Dial type extensometers are also used in some tests.



LONG TIME high temperature creep data for nickel alloys are recorded on these testing machines at International Nickel Co. laboratory.

DUCTILE IRON
NEW ENGINEERING MATERIAL



Ductile Iron casting has replaced steel for this die shoe used on press forming automobile parts.

- TENSILE STRENGTH
  60,000 PSI, to 115,000 PSI
- ELONGATION
  As cast: approx. 3%
  Annealed: 15% to 22%
- YIELD STRENGTH
  45,000 PSI to 65,000 PSI

A variety of Ductile Iron castings

A pioneer in the production of this remarkable metal, the BELOIT FOUNDRY conducts a constant program of research and analysis to meet the growing demand for Ductile Iron. We will gladly answer inquiries about applications of Ductile Iron (or our other irons) to your products.

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HEAT STANDARDS:

NBS materials permit wider, more accurate heat measurements.

Extension of heat measurements toward the extremes of the temperature scale has led the National Bureau of Standards to develop new standards of heat capacity for use at temperatures where water, the present standard substance, cannot be used.

Special samples of three materials—benzoic acid, *n*-heptane, and aluminum oxide—have been prepared and their heat capacities determined over most of the useful temperature range. A limited number of these samples are being made available to laboratories equipped to make very precise measurements of heat capacity.

Water Limits

Because water is universally available in high purity, it has been used as a standard for heat-capacity measurements since the early development of calorimetry. However, recent developments in such fields as low-temperature physics, nuclear engineering, and jet propulsion have made it necessary to extend heat measurements to both very high and very low temperatures.

Although water has served admirably as a heat-capacity standard in the range from 0° to 100°C, it is not well suited to use outside this range. Below 0°C its large expansion on freezing makes it too hazardous for many calorimeters while above 100°C its increasing vapor pressure usually makes it impractical for use.

Preparing Samples

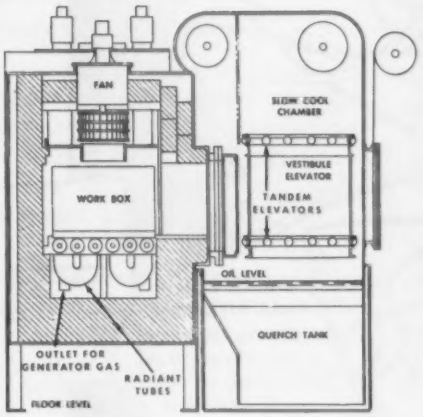
To prepare the samples, benzoic acid was fractionally crystallized to a purity of 99.997 mole pct, and *n*-heptane was both fractionally distilled and crystallized to about the same purity.

Aluminum oxide samples were prepared from commercially available synthetic sapphire (corundum). The heat capacities of these materials were measured by D. C. Ginnings and G. T. Furukawa of the NBS thermodynamics lab-

Turn Page

DOW

FIRST with MECHANIZED BATCH — TYPE CONTROLLED ATMOSPHERE FURNACES



MODEL "J"

The Dow Model "J" is a small mechanized furnace for production carbonitriding, gas carburizing, clean hardening, carbon restoration and bright annealing. It is the ideal furnace for small heat treaters and manufacturers where flexibility is required. Size: 7'10" wide, 14'4" long—head room 15'. Production capacity: 250-350 lbs. per hour on light case work.

NOW GIVES YOU A SMALL FURNACE WITH THESE OUTSTANDING FEATURES—

1. Tandem Elevator construction permits reloading furnace while load is in oil quench or slow cool chamber.
2. Fan (5000 cfm) removable from outside and heat capacitors provide positive directional flow of atmosphere.
3. 4 Vertically mounted Radiant tubes with 600,000 BTU per hour input with built-in generator.

DOW FURNACE COMPANY

OPTIONAL FEATURES

Hot Oil Quench system—provides exceptional distortion control. Large gas fired immersion tubes supply heat at low intensity thus minimizing oil breakdown.

Slow Cool Chamber permits cooling of a full furnace load in atmosphere and reloading without loss of time.

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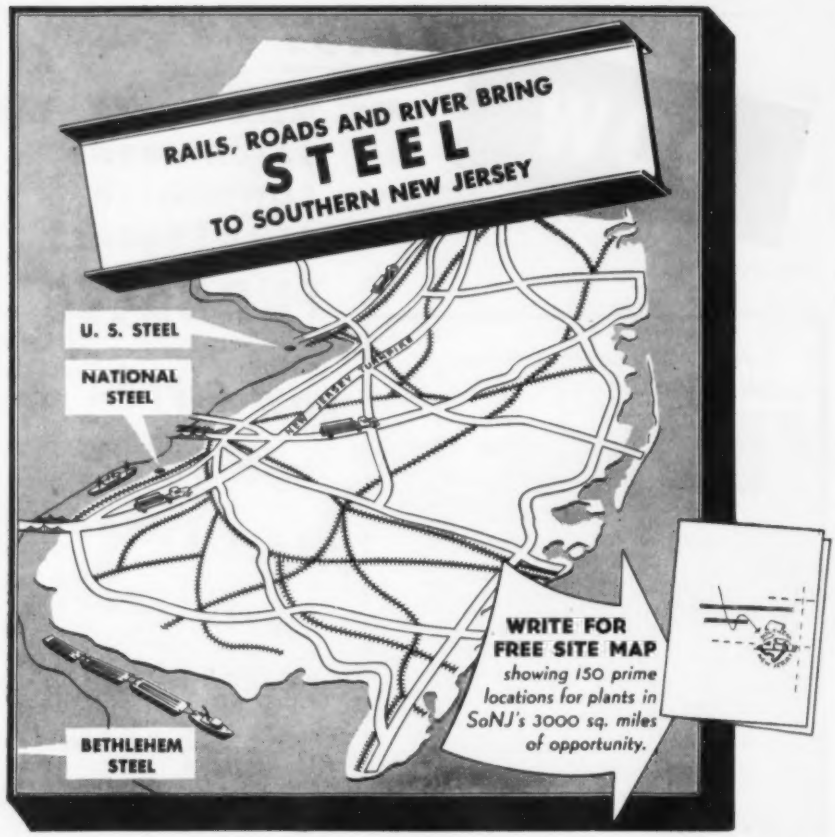
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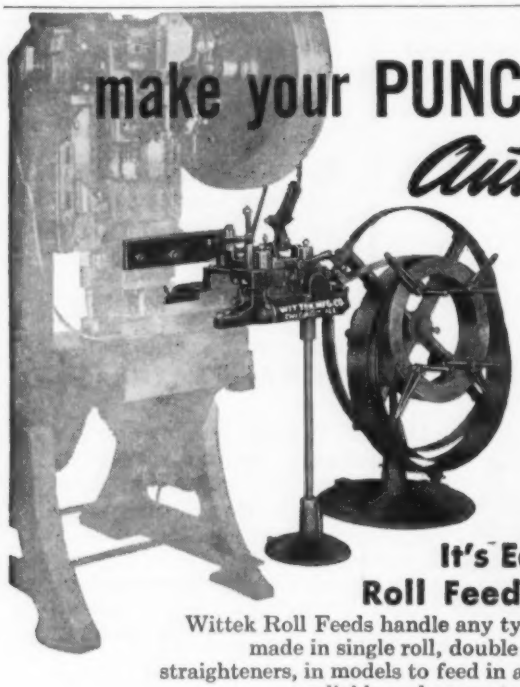

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oratory over the range from 259 to 900°C, which includes mos useful temperatures. Except a the extremes of the range, the re sults are believed to be accurat to about 0.1 or 0.2 pct.

What They Do

In general, benzoic acid will b useful as a standard when a soli is needed at temperatures belo 80°C. *n*-heptane can be used effec tively up to about 130°C; it pro vides a liquid standard which ca be distilled in and out of a calori meter and which does not expan on frezing (at −90.6°C).

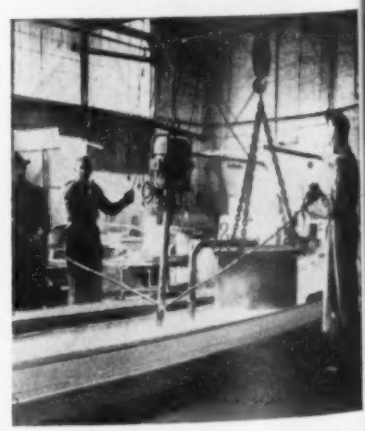
Aluminum oxide is unique among these materials in that it can serv as a practical standard in the en tire temperature range up t 900°C; and as soon as accurat measurements of its heat capacity are available at higher tempera tures, it should be usable up t 2000°C.

A fifth material—diphenyl ether —has also been suggested as a heat-capacity standard.

Galvanizers to See New Pump

A recently developed Danish dross pump and separator will be demonstrated for the first time in this country at the Armco Steel Corp. plant in Middletown, Ohio, during the annual meeting of the American Hot Dip Galvanizers Assn., Mar. 19 and 20.

Three men are required to operate the J. C. Jensen units. The pump is removable. The separator is a permanent installation.



THREE MEN are needed to operate the dross pump with filtration pot.

Market Confused by Lack of Clear-Cut Decontrol

Holdover administrative bureaucrats drag their feet . . . and move is underway to retain standby control authority . . . industry demands clear-cut statement on decontrol.

This week the steel market is in state of confusion for lack of ficial word from Washington that eel control commitments actu-ly are going to end July 1. And p mobilization officials have rned cold shoulders on industry roposals for immediate announce-ent to clarify decontrol inten-ons.

Adding to the confusion is the gative force of bureaucratic oldovers dragging their feet in dministering decontrol. In effect, eir grudging acquiescence is botaging clear cut decontrol in-ntions of the Administration.

Due to Die . . . Steel controls uthority under the Defense Pro-uction Act is scheduled to die ne 30, and President Eisen-wer has indicated he does not ant standby authority. But there s been no clear cut statement om administrators that Con-olled Materials Plan commit-ents will end then.

Meanwhile, a bill to provide tandby control authority has been troduced, and public hearings on e subject were scheduled to gin before the Senate Banking ommittee this week.

Missing Action . . . Conspicu-usly missing from the Office of efense Mobilization order of Feb. , ordering immediate open-end-g of CMP and end of production eilings on manufacturers Mar. 31, as definite word that controls ommitments would end with the w June 30.

Last week, for the third time, e steel industry submitted to ational Production Authority a eport of recommendations on de-ontrol. Recommendations were preceded by a strongly worded statement of position recalling that lack of government action on previous recommendations made this report necessary.

What Industry Wants . . . The industry recommended: (1) Immediate permission to book unrated orders after honoring CMP tickets. (2) Immediate revocation (for period after June 30) of all CMP allotment authority other than for defense and atomic energy. (3) Immediate announcement (effective July 1) that production directives will be limited to defense and atomic energy needs. (4) Immediate announcement (effective July 1) revoking all other controls on production, distribution, use, and inventory of steel mill products. (5) Establish a steel industry task force to provide for emergency needs directly connected with defense or atomic energy but not qualifying for directives.

All or Nothing . . . The recommendations were presented as a package, no portion of which would be acceptable to the industry by itself.

Supporting the industry recommendations were these facts: Today, total steel requirements for defense and atomic energy are being filled with enough left over for civilian consumption considerably higher than before Korea.

Supply Is Greater . . . This greater availability is not related to steel ingots alone, but to finished steel as well. On a product-by-product basis for the second quarter there is no single item where defense and atomic energy needs absorb the increased availability measured against the pre-Korean period.

Some steel leaders are incensed at efforts to (1) retain control authority (even on a standby basis) after June 30 and (2) prolong allocation activity to the death knell of control authority. The latter, they fear, would leave them morally obligated to honor CMP commitments long after control authority is dead. In effect this could extend steel controls well beyond the clear-cut expressed intention of the Administration.

Consumers Worry, Too . . . The fuzzy termination of controls has raised serious doubts among consumers as well as producers. Can steel users in fact now safely depend on doing business with their suppliers? Or must they continue to look to holdover administrators in Washington for help?

Lines of communication between steel industry representatives and controls policy makers in Washington have not been kept open. This is blamed for the pitiful lack of clear-cut information on basic conditions outside of Washington.

Ingot Rate Holds . . . Steelmaking operations this week are scheduled at 100.5 pct of rated capacity, unchanged from last week which marked an alltime record for tonnage produced in a single week.

Scrap Market . . . Strength and weakness was evident in segments of the scrap iron and steel market early this week. New orders were awaited to show the future trend of prices. Adjustments in THE IRON AGE No. 1 heavy melting steel scrap composite forced a small rise to $44.00 but further clarification of the market was needed to bring No. 1 prices into clearer focus. The price trend on quality scrap was seen as up although consumer resistance may be forthcoming.

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Market Briefs and Bulletins

Sheets Short . . . Steel sheets continue to be extremely short in the Detroit area. Veteran sales and purchasing agents say supply has never been tighter and there are signs it will get worse. One big producer has dropped sheets from its books for the entire second quarter in an attempt to catch up with orders. Consumers are howling but there was no alternative.

Small Business Loan Limit . . . Small Defense Plants Administration has set a $300,000 limit on loans to small business firms. The agency has found that credit needs of legitimate small companies rarely exceed this figure. Exceptions will be made in cases where larger sums are needed to carry out direct defense contracts. Small business loans in the past 2 years have averaged $100,000.

Not Enough Reels . . . Office of Defense Mobilization estimates that production of shipping reels and spools for wire, cable and other products will be about 25 pct short of expected need by 1956. Completion of capacity expansion programs recommended by ODM will boost potential steel consumption of the shipping reel and spool industry from the present 17,500 tons to 23,000 tons per year.

Gas Line Priority . . . Second quarter priorities assistance will be given by the government in getting 140,000 tons of line pipe shipped to 10 major gas pipeline projects. Four of the projects are already under construction and have received previous steel allocations, but 6 others are to get allocations for starting the projects. At the same time, assistance will be given in obtaining 83,000 tons of pipe for 525 smaller projects, including distribution lines.

Structural Prices Cut . . . Phoenix Iron & Steel Co. lowered base prices for standard structural shapes last Thursday. New price is 4.95¢ per lb, a reduction of $23 per ton.

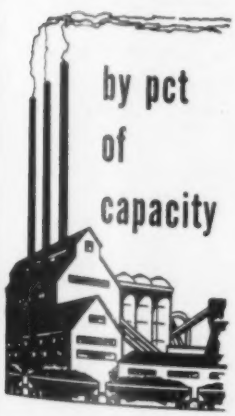
More Freight Cars . . . Reflecting increased availability of materials, production of new domestic freight cars rose to 7981 in January, the highest figure since March, 1952. New orders continued on the upgrade, American Railway Car Institute & Assn. of American Railroads reports. January orders totaled 5536 units, which just about matches the retirement rate.

Alaskan Oil Development . . . Phillips Petroleum Co. has contracted with Interior Dept. to conduct an oil development program on a 1 million-acre area near the Gulf of Alaska. Phillips will spend a minimum of $3.5 million and sink at least 12 wells over a 10-year period. Contract calls for $1.2 million worth of work. At least two wells must be drilled by July 1, 1956.

Ammo Box Capacity . . . Army ordnance and the Office of Defense Mobilization would like to see more capacity built for manufacture of metal boxes for .30 and .50 caliber ammunition. Productive capacity should be about 5,200,000 boxes, which is five times the 1,000,000-box capacity of 1950. How much capacity is still needed, they didn't say. However, Army Ordnance Corps will be glad to furnish details to anyone interested. And ODM says it will be glad to consider extending tax amortization to those who can come up and show an Ordnance contract.

Scrap Market . . . With not much new buying early this week the scrap market was holding at ceiling prices set by old orders. Yet there were signs of differentials between steelmaking grades creeping in. (See p. 170). But although there were signs of price rise resistance the trend seemed up on quality grades, lower perhaps on secondary material.

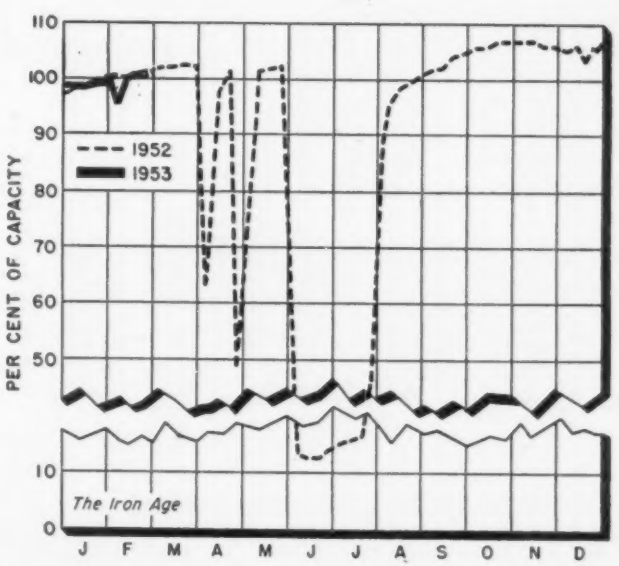
STEEL OPERATIONS



District Operating Rates

District	Week of Feb. 22	Week of Feb. 15
Pittsburgh	106.0	106.0
Chicago	102.0	102.0
Philadelphia	97.0	97.0
Valley	101.0	101.0*
West	107.0	107.5*
Cleveland	97.0	99.0*
Buffalo	94.0	94.0
Detroit	103.0	103.0
Birmingham (South)	98.5	98.5
Wheeling	102.0	102.0
South Ohio River	92.5	90.0
St. Louis	93.5	93.5
East	97.0	97.0
Aggregate	**100.5**	**100.5**

Beginning Jan 1, 1953, operations are based on annual capacity of 117,522,470 net tons.
* Revised



Scrap and Secondary Clearing Slowly

Aluminum ingots up 1½¢ to 2½¢ per lb . . . Ingot makers list tentative copper and brass buying prices . . . Brass mills call for end of all copper price lids—By *R. L. Hatschek.*

At least some of the confusion stirred up by the decontrol of nonferrous scrap and secondary metals began to clarify itself last week. But it will still take time for the trade to settle down into the normal patterns of free market business.

Aluminum ingot makers, who priced their wares on a "price at time of shipment" basis when the chaos was first injected, tentatively listed new levels at approximately 1½¢ to 2½¢ above the Office of Price Stabilization ceilings. There was a spread in some alloys which time and a settling market would probably erase.

Scrap Costs . . . The secondary aluminum prices were based on scrap prices anywhere from 4¢ to 6¢ higher than ceilings. Many refiners would still not quote even tentative or estimated prices until costs were more firmly pinned down.

Producers of brass and bronze ingot were slower to quote both new scrap buying prices and new ingot prices. But late last week, revised scrap buying prices were issued. Higher ingot quotations were issued this week. Increases ranged from ½¢ to 3¼¢.

New Prices . . . New scrap prices line up with custom smelter prices of 27¢ per lb for No. 1 copper wire, 25¢ for No. 2 and 23½¢ for light copper. New quotation on No. 1 composition is 23¢, composition turnings are 22½¢, rolled brass and brass pipe are 18¢, and radiators now bring 17½¢ per lb.

Ask Ceiling End . . . Decontrol of copper scrap 2 weeks ago seems to have had one effect that was just the opposite of desired. That's what brass mill men are saying. They claim copper scrap stocks are being hoarded in anticipation of the death of primary copper and brass mill product ceilings.

It works like this, claim the brass mills: Copper and brass will soon be decontrolled—possibly as late as Apr. 30 when the law expires. When that happens, the price of copper scrap could take another upward jolt. So anybody with copper scrap on hand or coming in would merely hold onto it in anticipation of fatter profits.

It Hurts . . . This means brass mills may well be cut off from an important raw material. Or they'll have to pay higher prices now while still under ceilings themselves. Either way you add it up, it's a mess.

If cut off from scrap supplies—the elimination of ceilings was designed to bring out larger quantities of scrap — the brass mills could be forced to shut down. If they pay top prices for scrap in order to keep operating, they'll be working sans profit.

Magnesium Production . . . Final 1952 production figures for magnesium brought the total for the year to 105,833 tons, third highest in the light metal's history. Fourth quarter output was 8990 tons in October, 9123 tons in November, and 9323 tons in December, according to the Magnesium Assn.

Despite the tremendous increase in primary metal production—only 40,881 tons in 1951—shipments of wrought magnesium dropped from the 1951 total of 9545 tons to 9133 tons. It should be pointed out that monthly consumption of magnesium is about 4000 tons for both civilian and military combined.

Lift Timetable . . . Office of International Trade has lifted the time schedule for filing first quarter applications to export several copper commodities and corrugated aluminum sheet.

First quarter quota for corrugated aluminum sheets is 2000 tons but since affected copper commodities are already under open-end quotas, no quantitative limit is set.

Products . . . Affected are: Copper base alloy pipe fittings, copper pipe fittings, brass and bronze welding electrodes and rods, phosphor copper brazing rods and wire, and copper welding rods and wires.

Meanwhile, in another action, OIT has extended the blanket license procedure to include all metal items on the positive list, thus permitting a number of orders to be covered with a single license.

Lead, Zinc . . . The London market for both lead and zinc turned a bit higher late last week maintaining their New York equivalents a trifle above the U. S. market.

NONFERROUS METAL PRICES

	Feb. 18	Feb. 19	Feb. 20	Feb. 21	Feb. 23	Feb. 24
Copper, electro, Conn.	24.50	24.50	24.50	24.50	....	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	....	24.625
Tin, Straits, New York	$1.21½	$1.21½	$1.21½	....	....	$1.21½*
Zinc, East St. Louis	11.50	11.50	11.50	11.50	....	11.50
Lead, St. Louis	13.30	13.30	13.30	13.30	....	13.30

Note: Quotations are going prices.
*Tentative.

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Market Waits for New Order Shakeup

Inertia of old OPS order holds many prices in line . . . But spreads begin to open up between No. 1 and No. 2 grades . . . See resistance to sharply rising prices on top grades.

Strength and weakness were shooting out in all directions in the scrap iron and steel market early this week. Inertia of old OPS-era orders carried a good part of the market but spreads were beginning to yawn between No. 1 and No. 2 heavy melting grades and bundles.

This week the steel industry was faced with the task of firming up their policy on scrap procurement. Tendencies for price increases were present in quality grades and downward impulses were strong in many secondary grades. Differentials could open up from drops as well as price rises. (See Pittsburgh.)

Ideal from the consumer's standpoint would be permitting moderate increases on quality grades and watching prices of poorer stuff slide somewhat. In some areas rejection of No. 2 bundles was common. Consumers had large stockpiles as an influential weapon in trading. Yet, since OPS restrictions are dropped openhearth users can now bid for quality material denied them before.

Much of the abundant stockpiles of some mills is No. 2 material and quality scrap is needed to sweeten the charge. There was certain to be resistance from openhearth users against sharp price increases. (See Detroit, Pittsburgh.)

Pittsburgh—Scrap prices held fairly steady this week in absence of new buying. No. 2 steel and No. 2 bundles were off $1 per ton to establish a more realistic spread between them and No. 1 heavy melting. In fact some consumers are thinking in terms of a greater spread between No. 1 and No. 2 steel, plus another differential downward for No. 2 bundles. Latter is in general disrepute here due to poor quality. Latest railroad list was awarded on basis of old OPS ceilings.

Chicago—Market hung fire here last week, but appeared bullish. Several new contracts were written at above ceiling, and brokers indicated some feeling that bundles would tighten abruptly. Turnings continued to stagger. At dealer level they were being offered at well below ceiling with no takers. Situation appeared particularly off in Milwaukee. Turning situation was further complicated by new order that indicated a $32.50 to $34.50 consumer delivered price but not to include commission. Considerable scrambling after railroad grades.

Philadelphia—Although there were signs of weakness in these grades, No. 2 steel and bundles and blast furnace grades continued to move at ceiling on strength of old orders. On No. 1 heavy melting there was no business as such but to begin opening up a realistic differential between No. 2 the price of No. 1 was moved up $1. The differential will widen with market clarification.

New York—No. 1 heavy was not moving (as such) in this district. When it reappears the proper price differential will be more firmly established between that grade and No. 2 steel. On appraisal, No. 1 heavy melting was pegged at $38 to $38.50 by the trade. Trend of No. 2 bundles may be down later. Lifting of OPS use restrictions will permit openhearth users to bid up better quality grades. Much No. 2 stuff has accumulated and some mills need better scrap to sweeten the charge.

Detroit—No. 1 bundles, the dominant factor in this market, have not yet been tested in a free market. Openhearths are standing firm on former ceiling levels and contend they will not go above them. Big General Motors lists close this week and their results may hold the key to the market. Electrics are not firm on pric and offers vary from day to day.

Cleveland—Sale of short rails ft and under) has moved that it up $2 to $53. All other prices mained steady. Large inventory mills here and in the Valley may w against price rises. More realis price alignment between heavy m ing and No. 2 bundles will find p mium grades moving up while b dles hold near present levels.

Birmingham—Southern scrap b kers and dealers are "sitting tig waiting for mills to announce n prices, expected to be on a deliver basis, with a sliding scale to ta freight rates from distant poi partly into consideration. Brok here early this week said they ha sold no blast furnace or openhear scrap this week and are buying no And they predict that even after n buying prices are announced th will be good only from day to d at least for a time. Dealers say th are offering prices they believe w enable them to make a little pro

St. Louis—Ceiling prices contin to prevail for steel grades with t trade very much confused as to t future. Steel mills have sufficient i ventories to cover consumption f the next 70 to 90 days and are bu ing only small quantities as offer Movement has been good. Dema for cast iron grades continues lo Prices are unchanged.

Cincinnati—Trend toward weak turnings market has gained mome tum with report of a $34 sale in t area. Better grades are still goi for $36 but the market is expect to level off at $35. Speculation he is all centered on heavy melting a rail specialties. Majority of broke and dealers believe lid will be ke on specialty items and premium fa tory bundles.

Boston—The trade here was st holding the status quo on the streng of old orders made at OPS ceili prices. A differential between No. steel and No. 2 will of course appe Blast furnace is harder to move.

West Coast—Small shipments o old orders at old prices continued la week. Burning question is how muc mills will buy next month when ne prices will go into effect for larg orders.

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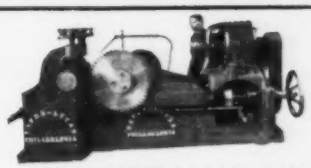

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NEWS OF USED AND REBUILT MACHINERY

See Price Slip . . . With price cutting becoming more frequent, there is a general feeling in the Chicago used machinery market that prices are on the downgrade and that dealers will have to pick up equipment at reasonable prices or run the risk of being stuck with a dangerously high-priced inventory.

Auctions in the area are still well attended, but dealers are hanging back on purchases from other sources. Several pieces of heavy equipment were turned down during the month because the prices were too high.

Dealers More Cautious . . . Increased dealer caution is a result of stiffening buyer resistance. A number of dealers report that prospective buyers have looked over reconditioned machinery on the floor and then turned it down. With new machine tools in easier supply, many of these customers appear willing to pay more to get new equipment.

But demand for electronics and automotive equipment remains strong. Milling machines, press and stamping equipment, jig borers, and some lathes have been moving well for the last month. There were reports that radials have fallen off slightly and that some press equipment was sold at very reasonable prices 2 weeks ago.

May Be Small Boom . . . With the market still slipping, dealers indicate present business level is off 25 to 50 pct from the lush 1951 period. Some used machinery men believe prices of new tools will climb when price controls are lifted and that a pocket-sized boom for used tools may result.

But expectations of market firming are not reflected in dealer buying rates.

Out-of-area sales are still moving fairly well, but there have also been price reductions in that phase of the industry.

Have Two Approaches . . . Chicago dealers are reacting to the market in two distinct ways, but both approaches are based on the belief that prices are going to drop.

One group favors buying very old or very late model equipment. Their reasoning: Old equipment is dirt cheap and they won't lose much if prices fall, while expensive late model equipment is still in strong demand and there is no difficulty in finding buyers.

Other dealers believe machinery built between 1935 and 1945 is the best market bet. This type of equipment is moving at lower prices and is still not too antiquated. By purchasing it cheaply now, the dealer can avoid taking the beating others will receive on inventories of more modern equipment should prices tumble.

Meantime, with an eye on the future, used machinery men are discussing declassification of freight rates to put used equipment in a lower freight category. They are convinced that high freight rates are bottlenecking shipments of used machine tools.

Locate Tools . . . Federal Security Agency reports recovery of almost $4.5 million worth of war surplus machine tools from educational institutions during 1952. FSA states that during the year more than 2000 machines were located and arrangements were made for allocation by National Production Authority to various defense plants.

Machines not accepted for defense work are being disposed of by transfer to other educational institutions or by sale to small manufacturers and machine tool dealers.

Agency officials say the recovery project will be continued on a limited basis.